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Foreword

Geriatric population is defined as subjects aged 60 years and above. The age pyramid of a country is a surrogate marker of its development. Advancements in health-care delivery with resultant better life expectancy and decrease in birth rate are some key factors that are responsible for the growing geriatric population in the developed countries. This demographic change is currently being witnessed by India also.

India entered the group of aging countries in 2001 with the population of persons aged 60 years and above exceeding 7%. Further the geriatric population is expected to double by 2026. Aging results in variable spectrum of manifestations in all organ systems including skin. A decline in normal functions of the skin, predominantly its healing capacity, immune responsiveness, and capacity to repair DNA, occurs with aging. Knowledge of common geriatric dermatoses in different regions can help us make effective health-care policies.

Elderly population constitutes a large and rapidly growing segment of Indian population. Dermatological diseases in elderly are increasing and thus put a great burden on health-care system. It is important to identify the patterns of geriatric skin disorders for effective delivery of health-care services.

An Indian Council of Medical Research (ICMR) report on the chronic morbidity profile in the elderly states that hearing impairment is the most common morbidity followed by visual impairment. However, different studies show varied results in the morbidity pattern. In India, elderly population is settled mainly in the rural areas. A study conducted in the rural area of Pondicherry reported decreased visual acuity due to cataract and refractive errors in 57% of the elderly followed by pain in the joints and joint stiffness in 43.4%, dental and chewing complaints in 42%, and hearing impairment in 15.4%. Other morbidities were hypertension (14%), diarrhea (12%), chronic cough (12%), skin diseases (12%), heart disease (9%), diabetes (8.1%), asthma (6%), and urinary complaints (5.6%).[1]

In a retrospective study from Uttarakhand, of the total 29,422 patients seen in dermatology department over 2 years, 7% (1,380) were aged 60 years and above. Male to female ratio was 2:1. Erythematosquamous disorders taken collectively constituted the major skin disorder seen in 38.9% patients. This was followed by infections and infestations (29.9%), senile pruritus (9.0%), and age-related skin changes (3.7%). Benign neoplasms were seen in 1.1% patients followed by cutaneous malignancies in 0.8% and precancerous lesions

in 0.4%. Fungal infections were the most common infections seen in 18% patients.[2]

National Programme for Health Care of the Elderly (NPHCE) was launched in 2010–2011 by the Government of India Ministry of Health and Family Welfare to provide comprehensive health setup completely dedicated to the health needs of the elderly. Tertiary care hospitals run special geriatric OPDs including geriatric dermatology OPD services. The program also proposes good quality geriatric health-care services at the primary level would greatly help in improving the utilization rates of the available health services. A "multi-disciplinary team" specifically trained to meet the needs of the geriatric population need to be created. Under the initiative of Dr Devesh Mishra, national president (IADVL), Special Interest Group (SIG; Geriatric Dermatology) was formed to create awareness regarding this emerging health challenge and to contribute to skin-related health-care delivery. Geriatric dermatology is a happening subspecialty fulfilling unmet needs of geriatric skin care.

The inaugural issue of the e-newsletter intends to sensitize its readers to dermatological problems of the elderly.

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Overview of Skin Diseases in the Elderly

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With the advancement in the field of health care and rising awareness, the life expectancy of the population has increased, causing the number of elderly people (>65 years) to be higher. With the rise in the geriatric population, comes their share of morbidity, in all medical conditions, including skin. When dermatologists deal with the older population, they come across a different spectrum of dermatoses, or different presentation of known dermatological conditions, and it is often difficult to treat them for various reasons. The skin of this population is markedly different from that of adults, they suffer from other comorbidities and often receive drugs for various chronic ailments. Apart from these factors, they constitute a share of dependent population, therefore they may not be socioeconomically sound and present late with cutaneous symptoms, may have impaired cognitive functions leading to difficulties in history taking and compliance of the treatment administered and many other factors.

Skin, like all the other organs undergoes multiple age-related changes known as chronological or intrinsic aging.[1] Furthermore, being chronically sun exposed, there is additional photoaging referred to as extrinsic aging. Intrinsic aging is noticed at photoprotected sites such as upper inner aspects of arm, hips, and buttocks and manifests as dryness, homogenous color, atrophy, and fine wrinkling. On the contrary, extrinsic aging additionally comprises of rough texture, dyspigmentation (hyper-, hypo-, or depigmentation), coarse wrinkling and telangiectasias, and is typically seen over the further classified extrinsic aging as hypertrophic or atrophic.[1] These changes occur due to decrease in skin lipids and barrier function, decreased cell replacement and DNA repair, and fragmentation of collagen and elastic fibers, leading to a loss of architectural framework for the dermal blood vessels and reduction in the immune function.[2] On top of that, it is also affected by cumulative effects of agents such as smoking and environmental pollutants.

Spectrum of diseases in the elderly population is wide (**Table 1**). The elderly population has been shown to have a higher incidence of inflammatory dermatoses, photodermatoses, infections, vascular compromise, psychodermatoses, and neoplastic changes (**Figures 1–4**).[2,3] Xerosis is one of the most common skin disorders experienced by most elderly people due to decreased skin lipids and a greater epidermal water loss. More commonly seen in the winter, it commonly manifests as generalized pruritus and may lead to eczéma craquelé and secondary bacterial infections in severe cases. Other causes of pruritus in the older individuals include systemic diseases such as chronic kidney or liver diseases, drug intake, malignancies, or other dermatoses. An increased incidence of seborrheic dermatitis is seen in the elderly, particularly in those suffering from neurological disorders such as Parkinson disease, epilepsy, and central nervous system (CNS) disease or trauma.[3] A reduced incidence of contact dermatitis has been reported in the elderly because of their reduced ability to mount a delayed-type hypersensitivity response

Table 1: Spectrum of Dermatological Diseases in the Elderly

Inflammatory dermatoses	Xerosis, pruritus, eczéma craquelé, seborrheic dermatitis, contact dermatitis, stasis dermatitis
Photodermatoses	Photoallergic dermatitis, drug-induced photosensitivity, actinic keratosis, actinic elastoses, actinic cheilitis, nodular elastosis (Favre–Racouchot syndrome)
Infections and infestations	Bacterial infections (erysipelas and cellulitis), viral infections (herpes zoster, disseminated herpes zoster, post herpetic neuralgia), fungal infections (cutaneous and nail dermatophytic infections), scabies, pediculosis capitis, pediculosis phthiriasis
Vascular compromise	Senile purpura or Bateman's purpura, lipodermatosclerosis, pressure sores, rosacea
Psychodermatoses	lichen simplex chronicus, neurotic excoriations, nodular prurigo, delusion of parasitosis
Neoplasms	Seborrheic keratosis, sebaceous gland hyperplasia, skin tags, cherry angiomas, keratoacanthomas, actinic keratosis, actinic cheilitis, Bowen's disease, leukoplakia, lichen sclerosus et atrophicus, melanoma and nonmelanoma skin cancers
Drug induced	Drug rash
Immunobullous disorders	Bullous pemphigoid, paraneoplastic pemphigus, mucous membrane pemphigoid, pemphigus vulgaris

Figure 1: Herpes labialis

Figure 2: Toe nail onychomycosis.

Figure 3: Stasis eczema.

Figure 4: Pigmented BCC.

due to decrease in Langerhans cells, T cells and decreased vascular reactivity. Stasis dermatitis has a higher incidence in this population due to increased vascular insufficiency.

A number of photodermatoses occur in the elderly due to their prolonged exposure to sun, which include photoallergic dermatitis, drug-induced photosensitivity, actinic keratosis, actinic elastoses, actinic cheilitis, and nodular elastosis, also known as Favre–Racouchot syndrome (comprising of comedo-like lesions, follicular cysts, and large folds of furrowed and yellowish skin).[2]

The elderly are predisposed to greater chances of infections and infestations because of their weak immune status, poor self-care, associated illnesses such as uncontrolled diabetes mellitus and malnutrition. A higher incidence of all bacterial, viral and fungal

infections is seen in this population. Superficial bacterial infections commonly occur in them and may lead to erysipelas and cellulitis if remained untreated. Viral infections particularly herpes zoster occur frequently in old age with higher chances of dissemination and postherpetic neuralgia and other complications such as ocular involvement. Commonly seen fungal infections include candida infections and cutaneous and nail dermatophytic infections, especially due to the slower nail plate growth rate in them. Cutaneous dermatophytic infections are often more difficult to treat and take longer in this population due to poor drug delivery, irregular compliance, and availability of few oral antifungals due to drug interactions. The elderly are also seen to have a higher number of infestations such as scabies, pediculosis capitis, and pediculosis pthirus due to improper self-care and daily cleansing.

There is a great degree of vascular compromise in the elderly. The dermal vasculature lies unsupported and trivial forces may tear them leading to purpuric or ecchymotic lesions. Senile purpura or Bateman's purpura occurs on photodamaged extensor aspects of arms with or without trauma.[1] Furthermore these patients also receive antiplatelet and anticoagulant drugs causing severe degrees of purpura.

Due to deep vein thrombosis or dilated varicose veins of the legs, chronic lipodermatosclerosis changes appear on the lower legs, with edema and stasis dermatitis, and in severe cases a venous ulcer may also develop, commonly near the medial malleolus. These maybe very difficult to treat and maybe diagnostically challenging from other causes of ulcers. Degrees of ischemic necrosis occur on pressure-bearing areas of these senile patients especially who have been immobilized since a long time and lead to pressure sores. Another common dermatosis seen in the aged population is rosacea; this maybe because of unsupported vascular framework in the dermis. It is often treatment unresponsive, may be associated with ocular rosacea, or may cause disfiguring abnormalities in the form of various phymatous growths.

A very commonly encountered complaint in these patients is itching over the areas of the body accessible by hands. They maybe self-induced or may occur as a result of peripheral nervous system damage such as radiculopathies and neuropathies. They often manifest as lichen simplex chronicus, neurotic excoriations, nodular prurigo, and delusion of parasitosis. These pose as chronic, difficult-to-treat dermatoses in these individuals and often require a liaison of dermatologist, psychiatrist, and primary care physician to treat the patient.

A great number of benign and malignant neoplastic changes affect the skin of the elderly, and it is important to distinguish between the two groups for proper management. Seborrheic keratosis, sebaceous gland hyperplasia, skin tags, and cherry angiomas (also known as Campbell de Morgan spots or senile angiomas) commonly occur over various sites in the elderly.[2] These conditions often do not require any treatment as long as the patient is not cosmetically bothered by these senile skin changes. Both melanoma and nonmelanoma skin cancers are predominant in the aged population. Most common of them is basal cell carcinoma (BCC); however, it is the least malignant. Lentigo maligna type of malignant melanoma may occur in the elderly and presents with brown black plaques with irregular pigmentation and borders. Squamous cell carcinomas are also more commonly reported in the older population and present as indurated growths or ulcers. Some other premalignant conditions maybe more common in this age group, which include keratoacanthomas, actinic keratosis, actinic cheilitis, Bowen's disease, leukoplakia, and lichen sclerosus et atrophicus. These conditions require prompt recognition and aggressive management in suspicious cases.

Certain immunobullous disorders are more frequently encountered in the geriatric population than the rest such as bullous pemphigoid, paraneoplastic pemphigus, mucous membrane pemphigoid, and sometimes pemphigus vulgaris.[3] The circulating autoantibodies result in separation between the keratinocytes and causes bulla formation. These can cause significant morbidity and mortality in the form of severe painful ulcers, which if extensive may cause significant fluid loss and result in skin failure. The ulcers may involve the mucosae, and ophthalmological care should be prompt in cases of mucous membrane pemphigoid as severe cases may lead to irreversible blindness.

Another very commonly seen conditions include drug rashes. These are often confused with other dermatological conditions and a corroborative drug history may not be available in the aged individuals. They are often recipients of polypharmacy and may be consuming multiple over-the-counter medications or supplements, or undergoing homeopathic and other local treatments. They may disregard these and may not consider them relevant and often reveal this information after specifically probing for them. A drug rash should always be suspected when cutaneous lesions appear suddenly and without any underlying cause.

It is often difficult to treat the skin conditions in the elderly. Many of the aging skin changes may not be amenable to treatment or may respond poorly and are better prevented by advising photoprotection than treated. As mentioned previously, they are receiving a number of drugs and treatment options become limited due to drug interactions, consequently dosages may need adjustments due to liver or kidney compromise. It is often noticed that they are unable to comply with the medications prescribed and may take erratic dosages or may forget to take them, therefore clinician should gauge the patient beforehand, explain in more detail, and administer appropriate drugs and keep it as simple as possible. It is always advisable to treat the condition by using a topical agent in most conditions where possible than administer a systemic agent. They should be advised bathing with tepid water, gentle cleansers, soft dabbing of the skin for drying, and immediate application of bland emollients generously all over the body to sustain the skin moisture. If topical corticosteroids are to be prescribed, their potency should be carefully chosen as the skin is often thinned out and the incidence of adverse effects is higher in them, and they may even be systemically absorbed. In such situations, topical calcineurin inhibitors may be a better choice for the treatment. They are also often sensitive to various ingredients of the topical medications and products, which may make the dermatosis worse. It may be advisable to do a patch test in doubtful situations and advise nonallergenic products. Effective management includes proper skin care and a team effort of primary care physicians, counselors, and dermatologists for complete care and improving their quality of life.

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Setting Up a Geriatric Skin Care Facility

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1. Place of practice/clinic:
   a. Easily accessible
   b. Preferably on ground floor
   c. Numerous wide self-explanatory display/ sign boards in large fonts
   d. Friendly/courteous ancillary staff
   e. Accessibility to a washroom and drinking water facility
   f. Separate waiting room/seats for senior citizens
   g. Priority to senior citizens in appointments
   h. Arrangement of adequate mobility aid/escort when needed if available during clinic visit
   i. Streamlined appointment system (**Figures 5 and 6**)
   j. Availability of ramp to avoid stairs
   k. Help desk to facilitate travel arrangements if needed/
2. Consultation:
   a. Have patience in history taking
   b. Make patient safe and comfortable
   c. Do not shy away from getting up and greeting the patient
   d. Optimize communication
   e. Be ready to give extra time if patient demands

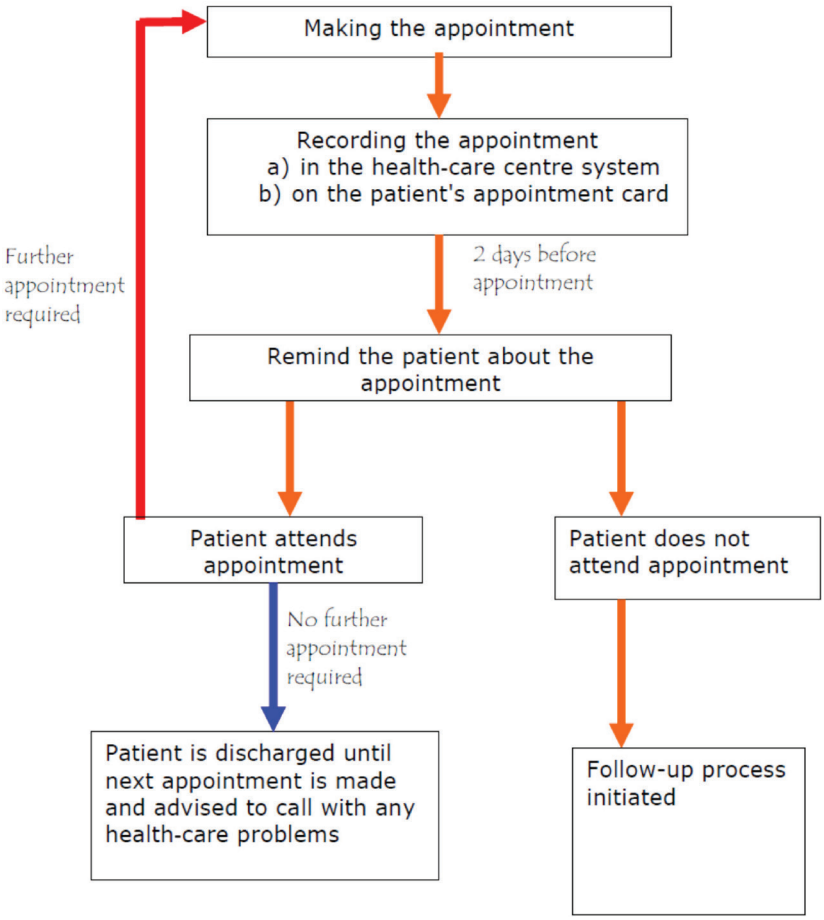

Figure 5: Suggested Flowchart Summarizing the Appointment System

Task	Skills
1. Greet the patient	✓ Establishing a relationship ✓ Speaking the patient's language
2. Ask for patient details: • Name • Identification number • Date of birth • Address	✓ Clarifying information
3. Ascertain patient request	✓ Listening
4. When would the patient like to be seen? • Date • Time	✓ Listening ✓ Probing
5. How long does the patient feel they need with the doctor?	✓ Ensuring appointment time is not too short
6. Would the patient prefer to see: • A particular doctor • A male/female doctor	✓ Ensuring continuity of care ✓ Considering gender sensitivity
7. Summarize: • Time and date of appointment • Name of practitioner they will be seeing • The length of appointment • What they should bring with them • Importance of punctuality • Estimated wait time (if any)	✓ Providing information
8. Provide appointment card	✓ Supporting memory

Figure 6: III.3.3 Checklist of tasks and skills for age-friendly appointments

f. Obtain detail drug history
g. Take history of multiple geriatric disorders: hypertension, ischemic heart disease (IHD), peripheral vascular disease (PVD), tuberculosis (TB), asthma, chronic obstructive pulmonary disease (COPD), pneumonia, dementia, stroke, thyroid, diabetes, sexual distress, osteoarthritis, osteoporosis, dyspepsia, gastroesophageal reflux disease (GERD), constipation, benign prostatic hypertrophy (BPH), menopause, urinary incontinence, prolapse, carcinomas, adverse drug reaction, and depression.
h. Assess dependency of patient on family members, both emotionally and financially
i. Assess cooperation profile and attitude of family members
j. Assess care giver's stress profile
k. Talk face to face
l. Talk less listen more
m. Do not argue or prove your point
n. Assess listening capability of patient
o. Assess socioeconomic and emotional status of patient

3. Management:
   a. Decrease disease-related anxiety of patient.
   b. Provide realistic solutions (e.g., it's futile to ask a geriatric patient to apply medication over back thrice in a day when he/she lives alone).
   c. Geriatric patients often need prescription of longer duration to avoid frequent clinical visits.

d. Frequent interdisciplinary coordination should be sought if needed
e. Quality of life should be the benchmark for planning treatment.
f. Stress on improving quality of life rather than complete subsidence of symptoms.
g. Provide proper written and verbal instructions for all medications.
h. For every medication, answer what (drug name), how (mode of drug delivery), when (drug frequency), how much (dosage), and how long (duration).
i. Patient should be given a helpline or clinical attendant's phone number for clearing any doubt regarding medications.
j. Keep prescription simple (avoid multiple drugs).
k. Rule out any drug interactions.
l. Ask patient to apply emollients and moisturizers as the case may be.
m. Try to use teledermatology effectively by providing option if possible. This will save your time and decrease travelling for patient.
n. Always try to provide a facility of ombudsman (may be your nurse or clinical assistant) whom patient can consult for clarifications if they are not satisfied with the dermatologist's interaction.
o. It helps if a pharmacy is available at clinic to avoid logistic hassles for geriatric patients.
p. Always provide an appointment card detailing next appointment to patient or care giver.

Management of Senile Xerosis

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Estimates suggest that the world's population aged 60 and over will more than triple from 600 million to 2 billion from 2000 to 2050. This increase is expected to occur mostly in developing countries, where the number of geriatric population will rise from 400 million in 2000 to 1.7 billion by 2050.[1] Aging of skin is caused by both intrinsic factors (natural or chronological aging) and extrinsic factors (photoaging induced by ultraviolet radiation). Senile xerosis is a common condition in the elderly presenting to the dermatology clinics.

Senescence results in a progressive damage to the epidermal barrier, which makes the old population particularly prone to cutaneous xerosis, asteatosis, and pruritus. The various factors responsible for disrupting this epidermal barrier include (i) less acidic skin pH that leads to a reduced activity of enzymes responsible for the lipid production, (ii) decreased ceramides, and (iii) reduced gene expression of aquaporin-3, which is a channel that allows for the flow of water and glycerol to maintain skin hydration. In addition, other functions of the skin also decline with age such as cell replacement and chemical clearance capacity, sensory perception, mechanical protection, wound healing, immune responsiveness, thermoregulation, sweat, sebum, vitamin D production, and capacity to repair DNA. As a result, certain changes are inevitable such as roughness, wrinkling, and laxity of the skin and atypical presentations of dermatologic diseases observed in elderly patients.[2]

Senile xerosis manifests as generalized dryness and roughness of skin that is most pronounced on the legs, and is often worse in winters (referred to as winter eczema, prurigo, or pruritus hiemalis) (**Figure 7**). The surface texture of the skin develops a cracked appearance in some patients, resembling crazy paving. This is known as asteatotic eczema or eczéma craquelé (**Figure 8**). Frequent washing and central heating also play a causative role in this condition by reducing atmospheric humidity.

Figure 7: Senile xerosis.

Figure 8: Asteatotic eczema.

Patients with xerosis often present with localized or generalized pruritus. Itching in old age can be severe enough to markedly hamper the quality of life. It is crucial to examine such patients thoroughly for primary cutaneous disease including scabies, bullous pemphigoid, candidiasis in undiagnosed diabetes, and lichen sclerosus. After ruling out a primary skin disorder, it is essential to investigate any elderly patient with generalized itching for systemic causes such as renal disease, cholestasis (especially chronic liver disease), thyroid disease, anemia, or cancer (particularly lymphoma, leukemia, and other myelodysplastic disorders).

The diagnosis of senile xerosis is predominantly clinical, but the stratum corneum hydration can be assessed objectively using a corneometer, which measures the electrical capacitance of the skin surface and is related to water content.

Management of this condition revolves around maintaining the skin hydration, and restoring the epidermal barrier function of skin (**Table 2**). Proper emphasis must be laid on general measures, which include avoidance of harsh soaps and detergents, frequent application of emollients, avoidance of very hot water for bathing and heaters, cutting nails short, wearing loose cotton clothes, and avoidance of scratching. The choice of emollients depends largely on the patient's preference, the degree of xerosis, and the physician's experience. Although ointments are more clinically effective due to their greasing properties, many patients dislike the consistency and find the residual staining of clothing and bedding highly unacceptable. Thus, lotions and creams are the favored preparations, particularly if being used on visible parts of the body. The frequency of application of emollients should ideally be every two hourly, or as often as possible. Moisturizing preparations in the bath are generally considered to be effective,[3] but bath oils can make the bath very slippery, which has its risks in the elderly and frail patient. Asteatotic eczema is best managed with mild to moderately potent topical corticosteroids for a short duration (1–2 weeks) along with antihistamines and emollients.

Table 2: Treatment of Senile Xerosis

General measures	• Loose cotton clothes • Avoid very hot water for bathing • Avoid scratching • Avoid use of harsh soaps
Skin hydration	• Frequent application of emollients • Ointments preferred if acceptable • Moisturizing soaps • Caution with bath oils
Specific treatment	• Topical corticosteroids if asteatotic eczema present

Timely recognition and an individualized treatment approach are prudent to avoid the physical and psychosocial morbidities of senile xerosis, and improving the quality of life in such elderly patients.

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Drug Reactions in the Elderly

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INTRODUCTION

The World Health Organization (WHO) defines adverse drug reactions (ADRs) as "a response to a drug which is noxious and unintended and which occurs at doses normally used in man for prophylaxis, diagnosis, or therapy of disease or for the modification of physiologic function."[1]

They can be predictable reactions (dose-related known pharmacological actions of the drug, such as toxicity, side effects, and drug interactions) or nonpredictable reactions (not related to the pharmacological action of the drug like intolerance, idiosyncratic reaction, and hypersensitivity reaction).[2]

Cutaneous adverse drug reaction (cADR) is a form of ADRs characterized by morphologic skin changes with or without systemic involvement. Mechanism of such cutaneous responses to drugs can arise as a result of immunologic or nonimmunologic mechanism.[3]

They can range from asymptomatic rash to life-threatening emergency conditions. Antibiotics, nonsteroidal anti-inflammatory, anticonvulsant are regarded as the most common inducers, but potentially all drugs can cause cADR.

The elderly population is at a greater risk of having any ADRs. The use of prolonged and multiple medicines to treat the associated co-morbid conditions such as diabetes mellitus, hypertension, cardiovascular disease, respiratory disease, kidney disease, psychiatric illness, and cancer in elderly, make them susceptible to a number of drug interactions and thereby ADR. A study showed that 20%–40% of elderly patients use at least five medications, so called polypharmacy or multiple-drug therapy, which may increase the risk of ADRs.[4]

Alterations of various pharmacokinetic and pharmacodynamics (altered drug metabolism and clearance) in an elderly may further contribute to the occurrence of such adverse reactions. Cognitive and psychological/emotional problems associated with old age may also have a bearing in adherence and development of ADR.

PREVALENCE OF CUTANEOUS ADVERSE REACTIONS

cADRs are the most common, recognizable and reported form of ADRs, presenting over 30% of all reported ADRs.[5] According to WHO database, adverse reactions such as rashes, pruritus, and urticaria are reported respectively from 4.2%, 2.7%, and 2.6% of patients receiving drugs. The incidence of adverse reactions increases with polypharmacy.[5]

There are limited data regarding the prevalence of cADRs in elderly. Much of the information is obtained from observational studies.

A study by Yalcin et al. found the prevalence of cADRs to be 1.4% during a 5-year period when analyzing 4099 geriatric patients.[6] A study conducted by the pharmacovigilance program of India found that cADRs accounted for the second most common cause of ADR (770/4357) in the elderly, after gastrointestine-related adverse effects.[7]

CLINICAL PATTERNS OF CUTANEOUS ADVERSE REACTIONS

cADRs have a wide spectrum of clinical manifestations ranging from mild self-limiting xerosis, urticaria, and morbilliform eruptions to severe life-threatening conditions such as Stevens–Johnson syndrome/toxic epidermolysis necrosis (SJS/TEN) and drug reaction with eosinophilia and systemic symptoms (DRESS).

The various clinical patterns of cADRs include the following[8]:

- Morbilliform eruption/exanthematous rash: It is the most common type of cADRs that appears almost anytime up to 3 weeks of drug intake and is characterized by erythematous macules and

or papules associated with pruritus, bilaterally symmetrical and distributed over trunk and extremities. Ampicillin, amoxicillin, and sulfonamides are among the most frequent causes, other common drugs include phenytoin carbamazepine, nonsteroidal anti-inflammatory drugs (NSAIDS), and ciprofloxacin. Less common drugs are cephalosporins, barbiturates, thiazide diuretics, phenothiazines, naproxen, and quinidine.

- Urticaria/angioedemal anaphylaxis: Urticarial reaction consists of itchy erythematous transient indurated papules or plaques located anywhere on the body may be rarely accompanied by angioedema (asymmetric subcutaneous swelling). These reactions occur within minutes to days after exposure of offending drug. Penicillin is the most common drug implicated in urticaria followed by other group of antibiotics such as cephalosporins, sulfonamides, and tetracyclines. The classic medications known to produce angioedema (without urticaria) as a side effect are angiotensin-converting enzyme (ACE) inhibitors. NSAIDs, penicillins, monoclonal antibodies, and radiographic contrast media are other drugs that cause angioedema. Anaphylactic reactions are life-threatening and present with rapid progression of hypotension, tachycardia, and shock as well as angioedema and/or urticarial lesion.
- Fixed drug eruption (FDE): It presents as well as circumscribed single or multiple, often pruritic erythematous and dusky macules, commonly present on the perianal area, genital area, lips, palms, or soles; however, they can be found anywhere on the body. The hallmark of FDE is that lesions tend to recur at the same site after reexposure of the offending drug. The reaction can occur as early as 30 minutes to 2 days after exposure. Common drugs implicated are sulfonamides, NSAIDS, allopurinol, barbiturates, laxatives, and tetracyclines.
- Erythema multiforme: It is an acute self-limiting condition, clinically presents as multiple symmetrical target/targetoid lesions over acral areas may or may not involve mucous membrane.
- SJS and TEN: They are serious life-threatening condition with mucocutaneous and systemic involvement with significant mortality. Typically, the onset of the reaction occurs 1–3 weeks after initiation of causative medication but can occur earlier, especially with recurrence. Clinically, SJS and TEN present with eruptions of atypical or typical targetoid lesions, erythematous macules, papules, vesicles, or plaques that develop duskiness and progressive bullous change and eventually desquamation of skin. Mucous membranes are invariably affected, most commonly the lips and oral cavity. Skin detachment of less than 10% of the body surface area is classified as SJS, between 10% and 30% detachment is SJS/TEN overlap, and greater than 30% is classified as TEN. The most commonly associated medications with SJS/TEN are antimicrobials, such as aminopenicillins, trimethoprim–sulfamethoxazole and other sulfa-containing antibiotics, NSAIDs, and anticonvulsant. Other culprits include allopurinol, barbiturates, carbamazepine, corticosteroids, lamotrigine, phenobarbital, phenytoin, and valproate.
- Hypersensitivity reaction/DRESS: The clinical presentation consists of polymorphic cutaneous eruptions, most commonly, morbilliform eruptions, but papular, pustular, or purpura may also occur. Liver is the most common systemic involvement, but other organs such as kidneys, lungs, and heart may also be involved. Typically, the eruptions occur 2–6 weeks after the initiation of the causative agent. Common culprits for hypersensitivity syndrome include antiepileptics (the aromatic antiepileptics such as carbamazepine, phenytoin, and, phenobarbital), sulfonamides, gold salts, allopurinol, dapsone, and minocycline. In the presence of a fever, skin rash, liver involvement, hypereosinophilia, and lymphadenopathy, hypersensitivity syndrome should be highly suspected, although having all these findings is rare.
- Lichenoid drug reactions: They are skin eruptions caused by certain drugs and compounds and can be identical or similar to lichen planus (**Figure 9**). The lesions are symmetrical, larger, and psoriasiform and often have a photo distribution. Mucosae are less commonly involved. The period between initiating the drug and the development of the lesions ranges from days to

Figure 9: Glimepiride-induced lichenoid eruptions in a 65-year-old female.

several years. Gold is the most common inducer followed by antimalarials, methyldopa, antihypertensives (beta blockers, calcium channel blockers), oral hypoglycemic agents, lithium, sulfonylureas, phenylenediamine derivatives, and thiazide diuretics.

- Acneiform eruptions: These eruptions are rare cutaneous reactions to a drug that produce lesions resembling acne vulgaris. The lesions appear as erythematous papules or pustules not associated with the presence of comedones. Lithium, androgens, oral contraceptives, corticosteroids, isoniazid, phenytoin, iodides, bromides, and epidermal growth factor inhibitors are drugs implicated in acneiform eruptions.
- Vasculitic eruptions: Drug-induced vasculitis is a leukocytoclastic vasculitis occurring as a result of hypersensitivity response due to immune complex deposition within the vessel wall. Clinically present as palpable purpura in the lower extremities and may involve other parts (**Figure 10**). Systemic involvement may also occur. Common drugs are allopurinol, NSAIDs, penicillin, cephalosporins, fluoroquinolones, and sulfonamides.
- Acute generalized exanthematous pustulosis (AGEP): It is a systemic pustular eruption, almost always associated with neutrophilia and fever. Onset is rapid within 2–7 days of drug exposure but can occur within 2–3 weeks. AGEP classically presents with edematous erythema beginning in the skin folds or on the face. Soon multiple small nonfollicular sterile pustules appear in these areas. Mucous membranes can be involved. Petechial, purpuric, and erythema multiforme–like lesions may be seen. Antibacterials, such as aminopenicillins or macrolides, are the most common culprits of AGEP. Other offenders include acetylsalicylic acid, allopurinol, griseofulvin, enalapril, itraconazole, and vancomycin.

Figure 10: Showing multiple, erythematous, violaceous papules with central necrosis due to cutaneous vasculitis secondary to levofloxacin.

Figure 11: Furosemide-induced bullous pemphigoid in an elderly male.

CLINICAL PATTERN IN ELDERLY

Very few studies have been carried out to determine whether elderly patients are more susceptible to some forms of cutaneous drug reactions. Most of the skin eruptions caused by drugs are not life threatening, but they can add an important factor for a poor quality of life among the elderly. The most common forms of cADRs reported include xerosis, maculopapular rash, urticaria, and angioedema. SJS, TEN and bullous pemphigoid (**Figure 11**) are among the rare forms of cADRs in elderly.[2,4]

DRUGS IMPLICATED IN CADRS IN ELDERLY

Antimicrobials, diuretics, hypoglycemic agents, NSAIDs anticoagulants, antineoplastic agents, cardiovascular medicines, and analgesics are responsible for more than a half of the ADRs.[2,4]

CONCLUSION

Elderly population is at a higher risk of developing ADR. Recognizing these ADRs early and knowledge of adequate prescription of drug and limiting the use of unnecessary drugs along with regular monitoring can prevent and reduce the occurrence of such events.

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