

An Observational Cross-sectional Study on Dermatological Co-morbidities in Patients with Hemiplegia Secondary to Cerebral Stroke in a Tertiary Care Teaching Hospital in Eastern India

SUBHRANSU SEKHAR JENA¹, BINAYAK CHANDRA DWARI², ROOPAM PANDA³, NIBEDITA PATRO⁴

ABSTRACT

Introduction: Hemiplegia due to cerebral stroke is associated with various dermatological co-morbidities, arising out of motor, sensory and autonomic dysfunctions.

Aim: To find out the different dermatological conditions prevalent in patients of hemiplegia secondary to cerebral stroke.

Materials and Methods: An observational cross-sectional study was conducted in the Department of Neurology in collaboration with the Department of Dermatology at Hi-Tech Medical College and Hospital, Bhubaneswar, Odisha from July 2017 to June 2020. Patients with hemiplegia of more than one month duration were included. The skin findings present before the neurological insult and patients with systemic conditions like atopic dermatitis, diabetes mellitus and thyroid disorders causing skin changes were excluded. Relevant tests for diagnostic confirmation of the skin lesions were done wherever needed. The software Statistical

Package for the Social Sciences (SPSS) version 16.0 was used for the statistical analysis.

Results: Study included 411 patients of cerebral stroke. A total of 382 (92.9%) patients were found to have dermatological manifestation. The male:female ratio in the study population was 2.6:1. A total of 549 and 128 skin conditions were diagnosed in the paralysed and non paralysed limbs, respectively. The common dermatological conditions diagnosed in the affected limbs were, xerosis {371 (97.12%)}, tinea corporis/cruris {61 (15.97%)}, onychomycosis {31 (8.12%)}, tinea pedis {28 (7.33%)} and nail dystrophy abnormalities {27 (7.07%)} patients.

Conclusion: Knowledge of various dermatological conditions associated with hemiplegia helps in early intervention and better management during rehabilitation phase of patients with hemiplegia.

Keywords: Dermatoses, Neuronal palsy, Onychomycosis, Xerosis

INTRODUCTION

Cerebral stroke is a major cause of long term morbidity and mortality, affecting adversely the social, psychological and economic status of the patients and their caregiver. This is the third most common cause of death in the developed world after cancer and ischaemic heart disease [1]. It is widely prevalent in low-income and middle-income countries like India [2]. Cerebral stroke occurs when the normal blood flow to a part of the brain is interrupted either by a blockage (ischaemic stroke) or rupture of a blood vessel (haemorrhagic stroke). Patients with stroke, have involvement of motor, sensory and autonomic functions of one or more limbs leading to monoplegia or hemiplegia. One of the most common organs affected secondary to the nervous (sensory and autonomic) system dysfunction is the skin. As Central Nervous System (CNS) and skin have common ectodermal origin, sometimes anomalies occur together [3].

Few case reports and studies have documented various dermatological disorders in patients of hemiplegia, paraplegia and tetraplegia [4-12] and one study from India [13] outlines the dermatoses associated with CNS disorders in general. Present study aimed to outline the common dermatological conditions (localised to the limbs) seen in patients with hemiplegia, the results of which will help to provide an insight into the overall dermatological problems associated with cerebral and have considerable impact on comprehensive care.

MATERIALS AND METHODS

An observational cross-sectional study was conducted in the Department of Neurology in collaboration with the Department

of Dermatology at Hi-Tech Medical College and Hospital, Bhubaneswar, Odisha from July 2017 to June 2020. An informed consent was taken from all the patients and Ethical Clearance was obtained from the Institutional Ethical Committee (HMCH/IEC/DER/2017-18/161).

All patients attending the Neurology Department with hemiplegia of more than one month duration were thoroughly examined for any dermatological changes in the affected as well as unaffected limbs. A total of 972 patients with hemiplegia attended the Neurology Outpatient Department within the study period, out of which 411 patients presented for more than one month duration of the palsy.

Inclusion criteria: All the patients suffering from hemiplegia secondary to cerebral stroke for more than one month duration and who came during stated period of study were included.

Exclusion criteria: The exclusion criteria included skin findings present before the neurological insult and diseases like diabetes mellitus, thyroid disorders, atopic dermatitis, causing skin changes.

The routine investigations to rule out systemic diseases were done in all patients, which ever applicable. The relevant tests like staining for fungus/bacteria, culture, skin biopsy etc., were done wherever needed, either to confirm the clinical diagnosis or to aid in proper patient management. A Potassium Hydroxide (KOH) staining was done in 42 patients. Gram's staining and bacterial culture and sensitivity in 3 and 1 patients respectively and a skin biopsy was done in 2 patients.

STATISTICAL ANALYSIS

All statistical analyses were performed by Statistical Package for the Social Science (SPSS) version 16.0 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics was used and results were expressed in numbers and percentages.

RESULTS

A total of 972 patients with hemiplegia attended the Neurology Outpatient Department within the study period, out of which 411 patients presented for more than one month duration of the palsy. On clinical examination of the 411 patients, 382 (92.94%) were found to have some cutaneous disturbances [Table/Fig-1].

Variables	n (%)	n (%)	Total (%)
Gender	Male	Female	382
	276 (72.2%)	106 (27.8%)	
Age (years)			
20-39	31 (11.2)	13 (12.3)	44 (11.5)
40-59	148 (53.6)	34 (32.1)	182 (47.6)
60-79	89 (32.2)	53 (50)	142 (37.2)
≥80	8 (2.9)	6 (5.6)	14 (3.7)

[Table/Fig-1]: Age and gender distribution of the study population (n=382).

The aetiology of stroke was ischaemic in 277 (72.5%) and haemorrhagic in nature in 105 (27.5%) patients. In the 382 patients, a total of 549 skin conditions were diagnosed in the paralysed limbs and 128 skin conditions were diagnosed in the non paralysed limbs. As the study patients are hemiplegic, the total number of paralyzed limbs included the hemiplegic upper and lower limbs.

The common dermatological conditions diagnosed in the affected limbs were, xerosis in 371 (97.12%) patients, tinea corporis/cruris in 61 (15.97%), onychomycosis in 31 (8.12%), tinea pedis in 28 (7.33%) and nail dystrophy in 27 (7.07%) patients [Table/Fig-2]. Contact dermatitis secondary to ayurvedic oil (Ashwagandha) massage was seen in two patients.

Skin disease	Number of patients, n=382 (%)
Xerosis	371 (97.12%)
Tinea corporis/cruris	61 (15.97%)
Onychomycosis	31 (8.12%)
Tinea pedis	28 (7.33%)
Nail dystrophy	27 (7.07%)
Trophic ulcer	19 (4.97%)
Contact dermatitis	7 (1.83%)
Bacterial infections	5 (1.31%)
Total number of skin conditions	549

[Table/Fig-2]: Different skin conditions diagnosed in paralysed limbs. % values were calculated from n=382

As patients had multiple skin diseases at the time of presentation, the total number of skin conditions diagnosed was more than the total number of patients examined.

The skin findings in unaffected limbs were tinea corporis/cruris in 58 (15.18%) patients, followed by xerosis in 33 (8.64%) patients [Table/Fig-3].

Skin disease	Number of patients, n=382 (%)
Xerosis	33 (8.64%)
Tinea corporis/cruris	58 (15.18%)
Onychomycosis	7 (1.83%)
Tinea pedis	17 (4.45%)
Nail dystrophy	8 (2.09%)
Bacterial infections	5 (1.31%)
Total number of skin conditions	128

[Table/Fig-3]: Different skin conditions diagnosed in non paralysed limbs.

DISCUSSION

The skin and nervous system are interlinked by their common ectodermal origin. Many skin diseases have associated neural symptoms and various conditions affecting the nervous system have cutaneous manifestations as well. The congenital syndromes affecting the nervous system also manifest with cutaneous signs. Some disorders have primary involvement of both skin and nervous system, but some skin disorders are secondary to the nervous system dysfunction. Altered manifestation of some skin diseases at sites of neurological deficit has been reviewed by Azimi E et al., [14]. Near or complete resolution of pre existing inflammatory skin lesions at the site of neural deficit marks the contribution of nervous system to inflammation. In our study on patients with hemiplegia the skin disorders following nervous system dysfunction were mainly focused on.

Cerebral stroke is more common with advancing age. About 75% of the patients survive the acute stage of focal stroke but suffer from long term physical disabilities and bed/wheel chair bound state. During this stage, many develop the dermatological co-morbidities.

Gul U et al., in their study on patients with hemiplegia and paraplegia found tinea pedis to be the most common skin disorder in the patient group followed by onychomycosis of toenails, xerosis of extremities and reduction of hair on the lower extremities [15]. Han Z et al., found infectious skin lesions followed by eczematous skin conditions to be the most common dermatological findings in patients following spinal cord injury [16]. Among the infectious conditions, fungal infections were more common than bacterial infections and seborrheic dermatitis, xerosis and contact dermatitis were the common eczematous skin conditions found in the patients. Other skin conditions observed less frequently were erythema multiforme, psoriasis, vasculitis, acne vulgaris, urticaria, ingrown toenail etc. Rubin-Asher D et al., in their study found local fungal infections to be the most common dermatological complaint in patients following traumatic spinal cord injury [12]. Less common complaints were psoriasis, hyperkeratotic lesions, bacterial infections, seborrheic dermatitis, acne, alopecia, scabies and allergic reaction. Of all the findings, 63.6% of the skin problems were below the neurological level of involvement.

In the present study, xerosis (97.12%) was the most common skin finding in the affected limbs of the patients. This may be attributable to the autonomic neuropathy in neuronal palsy patients leading to skin dryness. Sometimes sweating disturbance observed due to Horner's syndrome or hypothalamic dysfunction. In contrast xerosis was not a significant finding in the unaffected limbs (8.64%), where the autonomic nervous system was intact.

The second most common finding in the affected limbs was fungal infections in 120 patients (31.41%) which was also the first most common finding in the unaffected limbs {82 patients (21.47%)}. In our study, tinea corporis/cruris was the most common type of fungal infections in both affected (15.97%) as well as unaffected limbs (15.18%) followed by tinea pedis and onychomycosis. The reason behind the increased incidence of fungal infections can be a lack of personal hygiene due to immobilisation, adding to it the high local climatic temperature and humidity.

Neapolitan nails were described by Horan MA et al., as presence of three distinct colour bands (as in the neapolitan ice cream) in the nails of some elderly dementia patients [17]. The nails show loss of lunula, white proximal band, normal pink middle band and distal opaque free edge. Reduced bone mass and thin

Author/year	Patient group	Age group (years)	Gender (Male:Female)	Number (%) of patients developing dermatological co-morbidities	Most common dermatological findings
Rubin-Asher D et al., (2005) [12]	Acute traumatic spinal cord injury 21 (tetraplegic) 25 (paraplegic)	30.2±11.1	38:8	14 (30.4%)	Fungal infection-11 (50%), Psoriatic lesions 2 (9.1%), Hyperkeratotic lesions-2 (9.1%), Bacterial infection-2 (9.1%)
Gul U et al., (2009) [15]	Hemiplegia (70) paraplegia (30)	Median 57	70:30	-	Tinea pedis (18%), Onychomycosis (14%), Xerosis (13%)
Nair PA and Umrigar D, 2013 [13]	Hemiplegia (15), Paraplegia (24), Quadriplegia (2)	-	-	28(68.3%)	Tinea cruris/ corporis-6, Bed sore-3, Intertrigo- 4, Eczema-3
Lee J et al., 2013 [24]	240 patients with brain damage	7 th decade of life (25.3%)	132:108	-	Seborrheic dermatitis (17.9%), Mycoses (15.5%), Drug-induced skin eruption (13.2%), Xerosis cutis (9.1%), Contact dermatitis (5.3%), Pruritus (4.4%)
Han Z et al., 2015 [16]	253 spinal cord injury	43.7±15.9	199: 54	17.9%	Fungal infection-76 (22.6%), Seborrheic dermatitis- 59 (17.6%), Bacterial infection- 27 (8.05%), Contact dermatitis-21 (6.2%)
Present study	382 Hemiplegia	55.2±16.4	276 (72.2%)/ 106 (27.8%)	382/972 (39.3%)	Affected limbs: Xerosis- 371 (97.12%), Tinea corporis/cruris-61 (15.97%), Onychomycosis-31 (8.12%), Tinea pedis -28 (7.33%) Nail dystrophy-27 (7.07%)

[Table/Fig-4]: List of studies describing dermatological co-morbidities in patients with neuronal palsy [12,13,15,16,24].

skin were proposed to be the cause by the authors. Neapolitan nails were not encountered in the present study. Unilateral clubbing in hemiplegia patients have been described by many authors [6,17,18]. Alveraz AS et al., proposed that hypertrophy and oedema of the soft tissues associated with autonomic dysfunction may be responsible for obliteration of the nail angle in hemiplegic limbs [6]. Siragusa M et al., also observed longitudinal reddish striations, neapolitan nails and unilateral clubbing associated with hemiplegia [19]. Nail dystrophy in the form of brittleness and brown/black discoloration (n=27) could be attributed to lack of nutrition and poor maintenance of hygiene.

An interesting less commonly encountered finding of bullous lesions unrelated to development of pressure sores or any form of local trauma has been observed by few authors [20,21]. They have been described as trophoneurotic blisters and attributed to impaired vasomotor reflexes followed by local vasodilatation leading to failure of local tissue nitration. Authors did not encounter these lesions in the present study.

Other less common findings observed in the present study were trophic ulcer and contact dermatitis limited to the paralysed limbs. Trophic ulcers were seen mostly on the frictional areas like, lateral malleolus in legs and greater trochanter on radius bones (elbow joint). Other studies have observed 1/3rd of paraplegic patients having pressure sores [22] and 50% of patients with spinal cord injury presenting with contact dermatitis [23]. There are few studies describing dermatological co-morbidities in patients with neuronal palsy [Table/Fig-4] [12,13,15,16,24].

Periodic dermatological examinations should be performed in patients with hemiplegia to prevent various complications. Caregivers and patients should be counseled regarding proper skin/nail care in the form of maintaining hygiene, moisturisation and aeration.

Limitation(s)

This study has a limitation of less number of patients being included. The associated risk factors contributing to the different skin pathologies were not studied. Further studies on a larger scale might help in delineating the associated risk factors.

CONCLUSION(S)

Most of the dermatological conditions secondary to neurological insult described in different literatures and also those encountered in

the present study are basically preventable with maintenance of proper care and hygiene. So, a knowledge of various skin conditions associated with nervous system dysfunction and early dermatological intervention allows better management in long term morbid patients of neurological dysfunction.

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PARTICULARS OF CONTRIBUTORS:

1. Assistant Professor, Department of Medicine, Hi Tech Medical College and Hospital, Bhubaneswar, Odisha, India.
2. Professor, Department of Dermatology, Venereology and Leprology, Hi Tech Medical College and Hospital, Bhubaneswar, Odisha, India.
3. Assistant Professor, Department of Physiology, MKCG Medical College and Hospital, Berhampur, Odisha, India.
4. Professor, Department of Dermatology, Venereology and Leprology, Hi Tech Medical College and Hospital, Bhubaneswar, Odisha, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Nibedita Patro,
Professor, Department of Skin and VD, Hi-Tech Medical College and Hospital,
Utkal University, Bhubaneswar-751025, Odisha, India.
E-mail: nibeditapatro@gmail.com

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