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Skin manifestations of malnutrition in HIV-positive meningitis patients



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Abstract

Background: HIV infection and meningitis are diseases which are known to precipitate malnutrition. Skin manifestations of malnutrition are easy to identify. We tried to describe the skin manifestations of malnutrition in HIV-positive patients with meningitis.

Setting: Patients included in the study were from a tertiary referral hospital in South India.

Methods: In a cross-sectional observational design, we studied 56 adult (> 14 years) HIV-seropositive patients with meningitis by clinical assessment of skin manifestations of malnutrition.

Results: Skin wasting (31.5%), hyperpigmentation of skin (22.2%) and skin ulceration (16.4%) were the chief skin manifestations of malnutrition in HIV-positive patients with meningitis.

Conclusions: Our study shows that certain cutaneous features of malnutrition like skin ulcers, skin wasting and hypo pigmentation are common in HIV patients with meningitis.

Keywords: Skin manifestations, Cutaneous manifestations, Malnutrition, HIV positive, HIV malnutrition, Meningitis malnutrition

Introduction

Malnutrition is common in patients with HIV infection. This may be due to decreased nutrient intake, impaired nutrient absorption, changes in metabolism, and increased requirements of energy, protein, vitamins and minerals (Shenkin 2006). It is also due to the high predisposition of these individuals to a myriad of infections such as chronic infections like tuberculosis, fungal infections, and gastrointestinal diseases like diarrhoea and malabsorption syndromes.

The malnutrition thus accrued by these patients, contributes to immune impairment, making the body further vulnerable to frequent illnesses (Duggal et al. 2012). One of the severe illnesses in HIV-infected individuals is meningitis. The involvement of the CNS in meningitis decreases appetite and makes the patients incapable of feeding themselves. Parenteral nutrition is not wholly adequate in most of these patients (Bari et al. 2016). Given that HIV-infected patients are more commonly affected by chronic meningitis with a protracted course,

the risk for malnutrition is even higher in this group of individuals.

Malnutrition has been reported in a high proportion of patients with both HIV infection and meningitis. Previous studies have shown lower BMI, decreased body weight and low mid-arm circumference in these patients (dos Santos and Almeida 2013; Hossain et al. 2009). But overt features of malnutrition of the surface organs such as the skin, hair and nails have scarcely been reported. A study of these features that can be easily observed by clinical examination can identify markers for malnutrition in this vulnerable group.

Only by identifying these features can the causes be ascertained and targeted therapies be planned. With this view, we describe the observed features of skin manifestations of malnutrition in HIV-positive patients with meningitis in a tertiary hospital.

Methods

The Government General Hospital, Guntur is a tertiary referral centre for 20 million people. It is located in the centre of Andhra Pradesh, a state in South India. It has 1200 beds catering to a large semi-urban and rural

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Table 1 Demographic profile of the patients

	HIV meningitis patients (n = 56)	HIV patients (n = 45)	Meningitis patients (n = 56)
Mean age \pm SD	35 \pm 9	31 \pm 2	40 \pm 3
Percentage of women	32.1%	22%	36%

**Fig. 1** Skin ulcers**Fig. 2** Atrophied, shiny skin

population. We took up a cross-sectional observational study in this setting from January 2017 to January 2019. We recruited 63 adult (> 14 years) HIV-infected patients who presented with meningitis. 45 HIV-seropositive

patients without meningitis and 56 HIV-seronegative meningitis patients were considered as controls. The HIV status of the patients was confirmed in the hospital by standard protocols. Patients tested positive with



Fig. 3 Hyperpigmented joint surfaces



Fig. 4 Breaks in the skin

antibody strip method were confirmed by ELISA and Western blot methods (“WHO | Diagnosis of HIV infection in infants and children,” *n.d.*). Clinical diagnosis of meningitis was based on the presence of a combination of fever, headache, altered sensorium, neck rigidity and signs of meningeal irritation. Confirmation of the diagnosis and identification of the etiological agent was done as per standard guidelines. Diagnosis was based on clinical presentation, past or contact history of tuberculosis, CSF lymphocyte count, glucose, protein, neuroimaging findings like obstructive hydrocephalus, infarcts, smear stain and culture and PCR. (Marais et al. 2010; Brouwer et al. 2004; van Ettehoven et al. 2017; Kupila et al. 2006). Written informed consent was taken from the patient or the next of kin in case of ill patients. The institutional ethics committee at Guntur Medical College, Guntur (GMC/IEC/033/2017) approved the study protocol.

In these patients, manifestations of malnutrition in the skin, hair and nails were noted. These features were as follow:

Skin ulcers—round or oval ulcers with sharp borders, deep bases with minimal surrounding inflammation (Galimberti and Mesinkovska 2016)

Skin wasting—thin shiny skin with sparse hair (Galimberti and Mesinkovska 2016)



Fig. 5 Depigmentation of hair

Skin hyperpigmentation—brownish pigmented macules with a clear border over bony prominences (Lee et al. 2006)

Pellagra—dermatitis, diarrhoea and dementia (Galimberti and Mesinkovska 2016)

Skin breaks—fine fissures (Lee et al. 2006)

Leukonychia—whitened areas in the nails (Cashman and Sloan 2010)

Brittle hair—fragile hair (Finner 2013)

Depigmented hair (Galimberti and Mesinkovska 2016)

Alopecia (Finner 2013)

Details were registered in MS Excel 2007 sheets. The data were analysed by SPSS version 20. The results are summarised with mean, SD and percentages.

Results

We included 56 HIV-seropositive patients diagnosed with meningitis out of 63 recruited. Seven patients were excluded due to inadequate data. The mean age of our patients was 35 ± 9 years, of which 32.1% were women (Table 1).

We found that skin wasting (31.5%), hyperpigmentation of skin (22.2%) and skin ulceration (16.4%) were the chief skin manifestations of malnutrition in HIV-positive patients with meningitis (Figs. 1, 2, 3, 4, 5 and 6). Other features were very less in proportion (Table 2).

In the 45 HIV-seropositive group without meningitis, the mean age was 31 ± 2 years, of which 22% were women. We found skin wasting in 11.7% of the patients and hyperpigmentation of skin in only 2.3%. In the 56 HIV-seronegative meningitis patients, the mean age was 40 ± 3 years, of which 36% were women. We found no skin manifestations of malnutrition.

Discussion

In our study, HIV-positive meningitis patients were found to have certain cutaneous features of malnutrition such as skin ulceration, skin wasting and hyperpigmentation of the skin.

Such skin disorders are reported in over 90% of HIV-infected people in other clinical studies (Innocenzi 2001). The mechanisms underlying are manifold. Firstly, HIV patients are commonly undernourished. HIV-seropositive individuals have reduced food intake, poor absorption of nutrients and abnormal metabolism (Shenkin 2006). This results in chronic malnourishment in these people. Since malnutrition is also an important detriment to the integrity of the integument, skin wasting is more common in HIV patients than normal age- and sex-matched people. These individuals thus have dry, atrophic skin prone to peeling and ulceration (Stefanaki et al. 2002; Zaidi and Lanigan 2010).



Fig. 6 Leukonychia

Secondly, HIV itself destroys the skin cells especially the Langerhan cells (Cedeno-Laurent et al. 2011). And thirdly, the presence of the virus in the body increases inflammatory cytokines in the circulation (Sokoya et al. 2017). These pro-inflammatory chemicals are harmful to the skin. As such, damage to the skin is more common in HIV individuals. Invariably, at some time in their illness, these patients manifest overt skin changes (Innocenzi 2001).

An easily perceived change in the skin is altered pigmentation. Hyperpigmentation of the skin is common in HIV patients (Singh et al. 2009). It is associated with up to 47% of HIV-infected individuals. It is caused by many nutritional deficiencies especially those of Vitamin C, B12 and Niacin (Galimberti and Mesinkovska 2016). As nutritional deficiencies are common in HIV-infected

patients, skin hyperpigmentation is commonly seen in them. Other causes of hyperpigmentation have been proposed in HIV patients. These include ART drugs causing hypersensitivity to sunlight, endocrine system disorders such as adrenal insufficiency and secondary infections causing hyperpigmentation (Jing and Ismail 1999). However, we considered only the characteristic hyperpigmented skin lesions (Galimberti and Mesinkovska 2016) of nutritional deficiency in our study. Hence, our study projects only these changes.

Meningitis in HIV patients is a devastating disease. It is more profound in seropositive individuals than in others (Thinyane et al. 2015). This culminates in the precipitation of a number of factors causing malnourishment which can manifest in the largest visible organ of the human body—the skin. Vomiting and altered sensorium, common features of meningitis in HIV patients, decrease appetite and limit food intake. Cranial nerve palsies causing dysphagia also decrease the nutrient intake. The altered gut absorption (Hausner et al. 2019) and motility further cut down the nourishment. Antibiotic therapy-induced microbiota changes, the increased nutrient utilisation by the chronically overwrought immune system and the disease-induced stress deprive the patient of essential nutrients. This malnourishment is reflected in the changes in the body including the more easily observed parts such as the skin, hair and nails.

The portents of malnutrition observed in our study might also be due to another important factor. Tuberculosis was the most common agent of meningitis in our patients. Tuberculosis is alternatively called consumption for good reason. It seems to consume the patient slowly, i.e. tuberculosis itself causes malnutrition (Ducati

Table 2 Features of malnutrition noted in the skin, hair and nails of HIV-positive meningitis patients

Characteristic	HIV
Skin	
Skin ulcers%	16.4
Wasting%	31.5
Hyperpigmentation%	22.2
Pellagra%	5.6
Breaks%	1.9
Hair	
Brittle%	3.7
Depigmented %	1.9
Alopecia%	0
Nails	
Leukonychia%	5.6

et al. 2006). This may be one of the reasons for the skin changes observed in this cohort.

Even with all these considerations, certain limitations of our study should be borne in mind. For one, 56 subjects is not a very large number of patients. And also, multiple other factors such as the socioeconomic standing of the patients might have affected our results.

Conclusions

Nevertheless, our study shows that certain cutaneous features of malnutrition like skin ulcers, skin wasting and hypopigmentation are common in HIV patients with meningitis. Therefore, these should be looked for by clinicians treating these patients and appropriate nutritional management should also be undertaken.

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Author's contributions

SA designed the study, collected and analysed the data, drafted and submitted the manuscript. The author read and approved the final manuscript.

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Availability of data and materials

Data can be availed from the corresponding author.

Ethics approval and consent to participate

Written informed consent was taken from the patient or the next of kin in case of ill patients. The institutional ethics committee at Guntur Medical College, Guntur (GMC/IEC/033/2017) approved the study protocol.

Consent for publication

Written informed consent was taken from the patient or the next of kin in case of ill patients.

Competing interests

The author declares that he has no competing interests.

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References

- Bari A, Zeeshan F, Zafar A, Ejaz H, Iftikhar A, Rathore AW. Childhood acute bacterial meningitis: clinical spectrum, bacteriological profile and outcome. *J Coll Physicians Surg--Pak JCPSP*. 2016;26:822–6.
- Brouwer AE, Rajanuwoong A, Chierakul W, Griffin GE, Larsen RA, White NJ, et al. Combination antifungal therapies for HIV-associated cryptococcal meningitis: a randomised trial. *Lancet*. 2004;363:1764–7.
- Cashman MW, Sloan SB. Nutrition and nail disease. *Clin Dermatol*. 2010;28:420–5.
- Cedeno-Laurent F, Gómez-Flores M, Mendez N, Ancer-Rodríguez J, Bryant JL, Gaspari AA, et al. New insights into HIV-1-primary skin disorders. *J Int AIDS Soc*. 2011;14:5. <https://doi.org/10.1186/1758-2652-14-5>.
- dos Santos ACO, Almeida AMR. Nutritional status and CD4 cell counts in patients with HIV/AIDS receiving antiretroviral therapy. *Rev Soc Bras Med Trop*. 2013; 46:698–703. <https://doi.org/10.1590/0037-8682-0125-2013>.
- Ducati RG, Ruffino-Netto A, Basso LA, Santos DS. The resumption of consumption: a review on tuberculosis. *Mem Inst Oswaldo Cruz*. 2006;101: 697–714. <https://doi.org/10.1590/S0074-02762006000700001>.
- Duggal S, Chugh TD, Duggal AK. HIV and malnutrition: effects on immune system. *Clin Dev Immunol*. 2012;2012 <https://doi.org/10.1155/2012/784740>.
- Finner AM. Nutrition and hair: deficiencies and supplements. *Dermatol Clin*. 2013; 31:167–72.

- Galimberti F, Mesinkovska NA. Skin findings associated with nutritional deficiencies. *Cleve Clin J Med*. 2016;83:731–9. <https://doi.org/10.3949/ccjm.83a.15061>.
- Haussner F, Chakraborty S, Halbgebauer R, Huber-Lang M. Challenge to the intestinal mucosa during sepsis. *Front Immunol*. 2019;10 <https://doi.org/10.3389/fimmu.2019.00891>.
- Hossain MI, Dodd NS, Ahmed T, Miah GM, Jamil KM, Nahar B, et al. Experience in managing severe malnutrition in a government tertiary treatment facility in Bangladesh. *J Health Popul Nutr*. 2009;27:72–9.
- Innocenzi D. Skin diseases associated with HIV infection. *Curr Top Pathol Ergeb Pathol*. 2001;94:1–38.
- Jing W, Ismail R. Mucocutaneous manifestations of HIV infection: a retrospective analysis of 145 cases in a Chinese population in Malaysia. *Int J Dermatol*. 1999;38:457–63. <https://doi.org/10.1046/j.1365-4362.1999.00644.x>.
- Kupila L, Vuorinen T, Vainionpää R, Hukkanen V, Marttila RJ, Kotilainen P. Etiology of aseptic meningitis and encephalitis in an adult population. *Neurology*. 2006;66:75–80. <https://doi.org/10.1212/01.wnl.0000191407.81333.00>.
- Lee BY, Hogan DJ, Ursine S, Yanamandra K, Bocchini JA. Personal observation of skin disorders in malnutrition. *Clin Dermatol*. 2006;24:222–7. <https://doi.org/10.1016/j.clindermatol.2005.11.002>.
- Marais S, Thwaites G, Schoeman JF, Török ME, Misra UK, Prasad K, Donald PR, Wilkinson RJ, Marais BJ. Tuberculous meningitis: a uniform case definition for use in clinical research. *Lancet Infect Dis*. 2010;10:803–12. [https://doi.org/10.1016/S1473-3099\(10\)70138-9](https://doi.org/10.1016/S1473-3099(10)70138-9).
- Shenkin A. Micronutrients in health and disease. *Postgrad Med J*. 2006;82:559–67. <https://doi.org/10.1136/pgmj.2006.047670>.
- Singh H, Singh P, Tiwari P, Dey V, Dulhani N, Singh A. Dermatological manifestations in HIV-infected patients at a tertiary care hospital in a tribal (BASTAR) region of Chhattisgarh, India. *Indian J Dermatol*. 2009;54:338–41. <https://doi.org/10.4103/0019-5154.57609>.
- Sokoya T, Steel HC, Nieuwoudt M, Rossouw TM. HIV as a cause of immune activation and immunosenescence. *Mediators Inflamm*. 2017;2017:6825493. <https://doi.org/10.1155/2017/6825493>.
- Stefanaki C, Stratigos AJ, Stratigos JD. Skin manifestations of HIV-1 infection in children. *Clin Dermatol*. 2002;20:74–86. [https://doi.org/10.1016/S0738-081X\(01\)00234-6](https://doi.org/10.1016/S0738-081X(01)00234-6).
- Thinyane KH, Motsemme KM, Cooper VJL. Clinical presentation, aetiology, and outcomes of meningitis in a setting of high HIV and TB prevalence. *J Trop Med*. 2015;2015:423161.
- van Ettehoven CN, van de Beek D, Brouwer MC. Update on community-acquired bacterial meningitis: guidance and challenges. *Clin Microbiol Infect*. 2017;23: 601–6. <https://doi.org/10.1016/j.cmi.2017.04.019>.
- WHO] Diagnosis of HIV infection in infants and children [WWW Document], n.d. WHO. URL <http://www.who.int/hiv/pub/paediatric/diagnosis/en/> (Accessed 8 Jan 2016).
- Zaidi DZ, Lanigan DSW. Skin and malnutrition, in: dermatology in clinical practice. London: Springer; 2010. p. 447–50.

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