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An observational analysis of effect of oral alpha lipoic acid plus topical lactic acid in patients with acanthosis nigricans at a tertiary care hospital Jaipur, Rajasthan

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Abstract—*Acanthosis nigricans is velvety, darkening of the skin that usually occurs in intertriginous areas. It is usually difficult to treat and commonly associated with underlying disorders like with diabetes mellitus and insulin resistance. Alpha lipoic acid, an organosulphur compound, previously used in obesity and condition of insulin resistance, can also be used combat the challenge of acanthosis nigricans.*

Index Terms—*Acanthosis nigricans, Alpha lipoic acid, HOMA-IR, Insulin resistance*

I. INTRODUCTION

Acanthosis nigricans is a velvety, darkening of the skin that usually occurs in intertriginous areas. ^[1]Acanthosis nigricans (AN) is most commonly associated with diabetes and insulin resistance, rarely it can be a sign of internal malignancy. ^[5] Facial acanthosis nigricans as a marker for insulin resistance. Insulin resistance is characterized biochemically by hyperinsulinemia. ^[2] At increased levels, insulin having crossed the dermoepidermal junction binds to the insulin-like growth factor-1 receptors, thereby exerting its growth promoting effects through proliferation of fibroblasts and keratinocytes, giving rise to the characteristic features of acanthosis nigricans.

α -lipoic acid (ALA) ^[3] is an organosulfur produced by plants, animals, and humans. ALA is a potent biological antioxidant located in mitochondria, where it is used as a cofactor for pyruvate dehydrogenase (PDH) and α -ketoglutarate dehydrogenase complexes and regulates glucose entry in cells.

Lactic acid ^[4] is an alpha-hydroxy acid that helps in increasing the cell turnover and thus helps in eliminating the dead skin cells on the epidermis.

The homeostasis model assessment (HOMA) of insulin resistance (IR) is a surrogate marker that estimates insulin resistance based on basal measurements of plasma insulin and glucose. The HOMA-IR index is calculated as the product of the fasting plasma insulin level (in milliunits per liter) and the fasting plasma glucose level (in millimoles per liter), divided by 22.5 or fasting insulin (mU/L) multiplied by fasting glucose (mg/dL) then divided by 405.

A HOMA-IR greater than 1.9 indicates early insulin resistance and that greater than 2.9 indicates significant insulin resistance. Henceforth, HOMA-IR is useful tool in diagnosing the underlying etiology of insulin resistance in patients of Acanthosis nigricans.

This study aims to find the relation of insulin resistance as guided by HOMA-IR in patients of acanthosis nigricans and the treatment response of alpha lipoic acid 200mg twice a day along with topical lactic acid 12% cream application twice a day for 6 months in same.

II. MATERIALS AND METHODS

This was a hospital based observational study where patients of acanthosis nigricans attending the Skin and VD outpatient department from July 2022 to December 2023 were studied with the sample study size of 30 patients.

In all patients HOMA-IR was calculated and were given alpha lipoic acid 200mg twice a day along with topical lactic acid 12% cream application twice a day for 6 months. Patients were reviewed at 2, 4 and 6 months and grade reduction of AN was measured

Following grading was used to measure grade reduction at the end of 6 months

Grading for acanthosis-

Grade 1-lesions present on close observation

Grade 2-margins limited to base of the skull;not extending to lateral margins of neck

Grade3-moderate lesions till the lateral margins of neck

Grade4-severe lesions extending to the anterior of neck

III. RESULTS

Out of 30 patients, 18 were male(60%),12(40%) were females.Amongst total 30 patients,20 patients (66%)had deranged HOMA-IR with 17 patients showing value of HOMA-IR >1.9 but <2.9 and 3 patients showing HOMA-IR >2.9 favouring insulin resistance etiology of AN.4 patients with derranged HOMA-IR were known cases of diabetes mellitus type2. Over 12(40%) patients showed significant improvement(two grade improvement) and 5 (16%)patients showed moderate improvement(one grade improvement).13 patients reported little to no improvement.Side effects experienced with ALA were dyspepsia and occasional bloating in 3 patients (10%) with no serious side effects.Side effects with lactic acid included dryness in 5 patients(16.6%)



PATIENT AT WEEK 0



PATIENT AT WEEK 6

IV. DISCUSSION

Current treatment paradigms for AN are shifting to include addressing the cutaneous pathology as well as the underlying disease or drug. An important consideration when evaluating a patient with AN is the potential for psychological distress. Non-medication options include weight loss and exercise to increase insulin sensitivity. While correction of underlying causes remains the mainstay of treatment, it is important to consider cosmetic options to improve patient quality of life that may be affected by the presence of AN lesions. HOMA-IR is an essential tool in extrapolating underlying physiology of AN. Alpha lipoic acid 200mg twice a day along with topical lactic acid 12% cream application twice a day for 6 months shows significant improvement of AN lesions with little to no side effects. Further treatment options and etiology markers of AN is a horizon that needs to be explored further in future.

CONCLUSION

Study shows insulin resistance as one of key etiology for AN which can be measured via HOMA-IR and a promising treatment outcome with use of oral alpha lipoic acid and topical lactic acid in patients with AN.

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