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Review Article

Expert consensus on the management of acne in India

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ABSTRACT

Acne, a common cutaneous disorder, is estimated to affect a significant proportion of the population at some point in their lifetime. It is one of the most common presentations reported in dermatological consultations in India. Treatment options for acne include topical, oral and procedural therapies. Patients with mild acne can be treated with topical therapies; however, those with moderate to severe acne require systemic cure. Oral antibiotic treatment, hormonal therapies and isotretinoin are the mainstay systemic therapies for acne. Additionally, procedural therapeutic modalities in dermatology include chemical peels, laser therapy, micro needling techniques, to name a few. Scientific advances are continually improving knowledge of acne and contributing to refinement of treatment options. Hence, it is vital for clinicians to regularly update their clinical practice patterns to reflect current standard. An experts' panel discussion involving dermatologists from across India was conducted, to outline a practical approach for the management of acne. The present consensus document focuses on the assessment of acne, use of topical treatments, role of systemic therapy and procedures in treating acne and post-inflammatory hyperpigmentation. It also emphasizes the role of patient education and counselling on prophylactic and treatment strategies in acne management.

Keywords: Acne, Topical therapies, Antibiotics, Chemical peels, Laser therapy, Micro needling

INTRODUCTION

Acne, also termed acne vulgaris (AV), is a disease involving the pilosebaceous unit that presents with noninflammatory lesions (open and closed comedones), inflammatory lesions (papules, pustules and nodules), and varying degrees of scarring.[1] It appears when hair follicles become clogged with dead skin cells and oil from the skin. Acne is associated with a broad range of potential harms including symptomatic discomfort, scarring, emotional stress, psychosocial distress, occupational impact and potential psychiatric interference such as depression and suicide.[2,3] The morbidity associated with acne can be reduced by identifying

individuals at risk of these sequelae.[3] Numerous topical, systemic, and physical treatment modalities are available for the management of acne.[4]

Experts' group meetings involving 99 dermatologists were conducted across major cities in India in 2021 to discuss evidence-based concept of acne and to gather expert opinions on effective management of acne. Clinical insights were drawn based on a set of questions on epidemiology, causative factors, diagnosis and treatment practice in the Indian scenario and a consensus document on acne prevalence, impact on patient life, potential determinants, assessment and management of acne and acne-induced post-inflammatory hyperpigmentation (PIH) was developed.

Epidemiology

Acne, a chronic inflammatory skin disease, has a lifetime prevalence of approximately 85% of the population which predominantly manifests during puberty and worsens throughout adolescence.[2,5] Acne can persist into adulthood, with a 50.9% prevalence rate of acne in women aged 20-29 years compared with 26.3% in women aged 40-49 years.[1] Acne results in significant morbidity correlated with residual scarring and psychological disturbances that concentrates into a negative impact on quality of life. Early intervention to decrease the physical and aesthetic burden of the condition is of high importance.[2]

Acne contributes to hyperpigmentation in the epidermis or dermis, or both, causing PIH.[6] Hyperpigmentation is a particularly common sequel after acne, especially in individuals with dark-skin tone and those who excoriate their lesions.[5,6] Hyperpigmentation in acne-affected patients may arise within a few days after resolution of the inflammation and erythema. Psychosocial distress, reduced self-respect and an impaired quality of life are major outcomes associated with acne-related PIH. Awareness of PIH and its subsequent treatment is necessary to avoid further deterioration of quality of life.[6]

Consensus point 1

In the experts' clinical practice, acne is reported by 20-40% of patients. Although acne is principally a disorder of adolescence, prevalence in adult subjects is increasing. Both persistent acne and late-onset acne are more common in women. Hormonal distribution is not the most common clinical presentation of acne in adult women. About two thirds of dermatologist visits are made by female patients and up to one third of all dermatologist visits for acne are by women aged >25 years. However, a greater number of male patients present with severe form of acne. The most common area of acne presentation is the face, followed by truncal region involving chest, back or shoulders. Increase in clinical severity, with presence of post acne, hyperpigmentation and scarring, worsens quality of life.

Etiological factors

Genetic factors, family history of severe acne, diet including chocolate and dairy products, menstruation, sweating, personal stress, ultraviolet radiation and environmental factors, mainly smoking, occlusive cosmetics and occupational exposures are several exacerbating factors contributing to acne pathogenesis (Figure 1).[1,2]

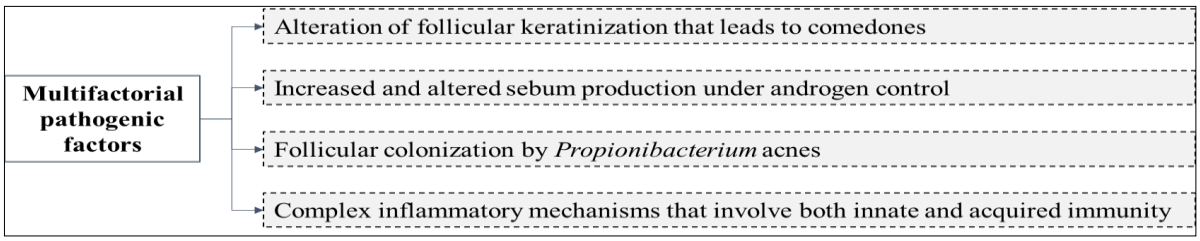

Figure 1: Multifactorial pathogenic factors contributing to acne lesions.

Consensus point 2

Experts supported the genetic basis for acne and reported that individuals with family history of acne tend to have more severe acne. A possible additive effect exists on the maternal and paternal family history of acne as a larger odds ratio of 2.6 is observed if both parents have acne, compared to odds ratios of 2.1 and 1.7 for maternal and paternal acne, respectively. Skin type can also influence acne severity because oily and seborrheic skin is associated with severe acne. Dairy products, whey protein supplementation, high or frequent chocolate intake and high glycemic load (GL) diet also influence acne presentation. Additionally, medical history (hirsutism, hyperseborrhea), being overweight, makeup usage, high mental stress and exposure to chemical substances are associated with acne.

Factors like elevated levels of serum insulin-like growth factor-1 and androgen receptor malfunction correlate with

development of acne lesions. Moreover, the variation of sebum production in women during menstrual cycle and premenstrual flare has partly been blamed on progesterone levels. Conditions such as polycystic ovary syndrome, hyperandrogenism-insulin resistance-acanthosis nigricans syndrome, seborrhoea, acne, hirsutism and alopecia syndrome and pyogenic arthritis, pyoderma gangrenosum are acne-associated syndromes. Experts also opined that certain systemic drugs such as corticosteroids, lithium, vitamin B12, thyroid hormones, halogen compounds (iodine, bromine, fluorine and chlorine), antibiotics (tetracycline and streptomycin), antituberculosis drugs, lithium carbonate and antiepileptic drugs can trigger acne-like eruptions.

In the present coronavirus disease pandemic situation, experts agreed that wearing masks for longer duration increases acne flare-ups due to higher temperature and humidity, resulting in perspiration on facial skin surface.

Acne severity grading

Acne lesions are described as open (black) and closed (white) comedones, inflammatory papules, pustules, nodules and cysts, which can result in scarring and pigmentary changes. The primary regions of lesion formation are face, neck, upper back, and chest.[4] Acne severity is classified according to different scales based on acne grading criteria namely, anatomic location (back, chest or upper arms), type and number of lesions (comedones, papules, pustules or nodules) (Table 1).[1,4]

Table 1: Grading of acne.

Acne grade	Description
Mild	Open and closed comedones with few inflammatory papules and pustules
Moderate	Papules and pustules, predominantly on face
Moderately severe	Many papules and pustules, and inflamed nodules, also on chest and back
Severe	Several large, painful nodules and pustules

Consensus point 3

According to the experts, acne grading systems should consider quantitative scaling parameters that specify the number and type of primary acne lesions; grading systems that assign weightage to lesion types, provide a severity index. Experts also stated that using the above-mentioned gradation system as most appropriate for classifying severity and treating accordingly.

Diagnosis and investigation

P. acnes inflammatory factors, bacterial growth metabolites such as allergens, toxins or porphyrins and enzymes are associated with acne severity and scarring. Acne is always accompanied by a variety of other signs and symptoms such as erythema, desquamation, burning, itching, dyschromia and pain.[2] The diagnosis of acne is primarily clinical, comprising of a thorough medical history and physical examination.[1,2] History of medications, supplements, lifestyle habits, menstrual history and prior/current acne treatments must be elucidated. Investigations in acne comprises of microbiological and endocrine testing, which are recommended in selective acne patients.[1]

Differential diagnosis

Different variants of acne include gram-negative folliculitis, bacterial folliculitis, acne keloidalis nuchae, acneiform eruptions, chloracne, periorificial dermatitis, pyoderma faciale, hidradenitis suppurativa, perioral dermatitis, adenoma sebaceum, pseudofolliculitis barbae, rosacea, seborrheic dermatitis, syringoma, keratosis pilaris, lupus miliaris disseminatus faciei and milia. These exhibit similar clinical and histologic appearance to acne vulgaris, but are distinguishable by clinical setting, severity and associated symptoms.[1,4]

Consensus point 4

Experts concurred that comprehensive discussion with acne patients should be conducted to assess symptoms of hyperandrogenism or other endocrinology disorders. Hyperandrogenism is observed in 70% of women with hirsutism. Patients should be asked about the nature and frequency of hair removal practices because it may obscure clinicians' recognition of hirsutism. If patients exhibit signs or symptoms of hyperandrogenism, thorough endocrine work-up should be initiated. Patients should be screened for androgen excess with measurements of serum testosterone levels (free and total). Pelvic ultrasonography can show the presence of polycystic ovaries in such patients. Moreover, for patients with acne-like lesions that are suggestive of gram-negative folliculitis, microbiologic testing is recommended. Anti-Müllerian hormone, free androgen index, serum prolactin (pooled), serum insulin (fasting and post prandial), thyroid-stimulating hormone and 17-hydroxyprogesterone are the mainstay of tests to be done. Sex hormone-binding globulin and serum cortisol are other tests performed.

Treatment of acne

Treatment for acne vulgaris aims to control and treat existing acne lesions, prevent permanent scarring, limit the duration of the disorder and minimize morbidity (Figure 2).[7]

Several acne treatments target various steps in its pathogenesis, from counteracting androgens and decreasing sebum production to preventing follicular occlusion, reducing *P. acnes* proliferation and decreasing inflammation.[4] Acne may be managed topically or systemically (with oral drugs).[7]

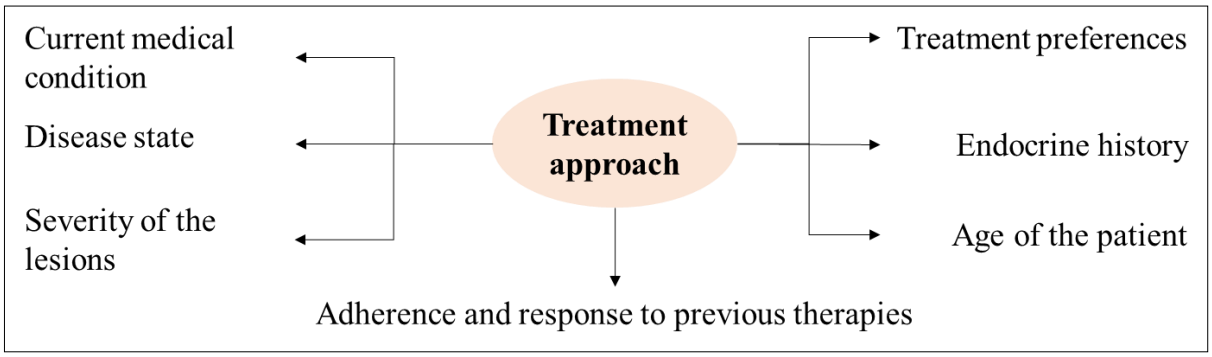

Figure 2: Factors determining treatment in acne patients.

Topical treatment

Topical therapies are one of the mainstay treatments for mild-to-moderate acne.[1] Advantage of topical products is direct application to the affected area, thereby, decreasing systemic absorption and increasing exposure of the pilosebaceous units for treatment.[7]

Benzoyl peroxide, a bactericidal agent, prevents the resistance of *P. acnes* to antibiotic therapy and exhibits moderate comedolytic and anti-inflammatory properties. Treatment can be fast-acting, with a response observed as early as five days.[4] Topical retinoids are an effective first-line therapy against comedonal and inflammatory acne.[8] They act on follicular keratinocytes to avert excessive cornification and follicular blockage and also reduce release of proinflammatory cytokines. Topical antibiotics like erythromycin and clindamycin are well-tolerated and reduce inflammatory lesions by 70%.[4] However, monotherapy with topical antibiotics should not be used routinely due to rising antibiotic resistance.[4,8] Combination therapy, for example, with retinoids and antibiotics, is more effective than either agent used alone. However, the agents should be applied at separate times, unless they are known to be compatible.[4] Side effects of topically applied anti-acne therapies include irritation, dryness, erythema, scaling, stinging/burning and itching.[8]

Restoration of skin barrier mitigates skin irritation. Tolerability of topical agents can be improved by incorporating drug dosing, titration, formulation strategies and adjunctive agents.[8]

Consensus point 5

Topical therapy is the standard of care for mild to moderate acne. Preparations for topical application are available in several formulations, namely, creams, gels, lotions, solutions and washes. Gels, pledgets, washes and solutions, tend to cause dryness, thus are useful for oily skin. Lotions, creams and ointments are helpful for dry and irritated skin. Benzoyl peroxide is a vital treatment option for mild to moderate acne. It is obtainable in various topical preparations, ranging in strength from 2.5-10%; however, it may be more prudent to start with a lower concentration. As it is believed that benzoyl peroxide 2.5% is as effective as 5% or 10%, it is often combined with clindamycin for better efficacy. Topical retinoids can be used as monotherapy for early non-inflammatory acne, in combination with clindamycin or benzoyl peroxide in more severe forms of acne or as a maintenance treatment. Topical retinoids should be applied all over the face and continued for long periods to avoid relapses. Patients should be instructed to apply very small amounts primarily and gradually increase the amount as per the tolerability level. Commonly available topical retinoids are tretinoin, adapalene and tazarotene. Adapalene 0.1% creams, gels and lotions are less irritating compared with other topical retinoids. Combination therapy has benefits like targeting different pathophysiological aspects simultaneously, increasing efficacy, fast action, better drug penetration to target sites, lesser scarring and lower post inflammatory hyperpigmentation; therefore, combination therapy is the preferred choice these days. Combination of adapalene and glycolic acid is effective in treating acne scars. Tazarotene locally has also been found to be used in the treatment of scars.

Topical dapsone 5% gel used for both comedonal and papular acne is effective and well tolerated in patients with moderate acne. Dapsone 7.5% gel is a viable option to add in truncal acne treatment. Salicylic acid is available in 0.5-2.0% strength, which can be applied 1 to 3 times daily as tolerated. Topical antibiotics such as erythromycin and clindamycin reduce inflammatory lesions and are well-tolerated. Clindamycin 1% solution or gel is the preferred topical antibiotic medication and is applied as a thin layer once daily. Addition of adapalene with clindamycin is effective in reducing total, inflammatory, and non-inflammatory lesions. Significant reduction in lesion counts can be achieved and the effects are evident as early as week 4. Hence, combination of clindamycin with adapalene/tretinoin can be used at the onset of therapy to obtain a good clinical response in mild-to moderate acne. However, in order to treat intense inflammatory acne, topical corticosteroids can be used in certain conditions, for a short duration.

Depigmenting agents

Dermal pigmentation is caused due to inflammatory damage to basal keratinocytes and melanophage formation. Several treatment strategies available for PIH include 2-4% hydroquinone, a tyrosinase inhibitor, used alone or in combination with a steroid and tretinoin. However, ochronosis, cataract, milia, nail pigmentation and loss of skin elasticity are the side effects associated with this regimen. In patients unresponsive to hydroquinone therapy, kojic acid may be useful.[9] Mode of actions of agents used to treat PIH are listed in Table 2.[5,9]

Table 2: Mechanism of action of different depigmenting agents.

Agents	Mechanism of action
Hydroquinone	Inhibits melanogenesis via reduction in active tyrosinase
Kojic acid	Inhibits production of free tyrosinase
Retinoids	Increases keratinocyte turnover, removes pigmentation, and reduces pigment transfer
Azelaic acid	Selectively influence hyperactive and abnormal melanocytes, preventing tyrosine-tyrosinase binding
Arbutin	Inhibits melanosome maturation
Vitamin C	Antioxidant activity
Vitamin E	Intervenes in lipid peroxidation
Niacinamide	Interrupts melanosome transfer from the melanocyte to keratinocyte
Plant extracts from grape seed, orchids, aloe-vera, marine algae, flavanoids, green tea, licorice, soy, umbelliferone and boswellia	Inhibits tyrosinase activity, mediates transfer of melanosomes to keratinocytes, or anti-inflammatory and anti-oxidant activities

Consensus point 6

The primary approach to PIH management is early and effective prevention (including sun protection) and treatment of underlying acne-associated inflammation. Topical depigmenting agents such as hydroquinone, azelaic acid, kojic acid and retinoids can be effective alone or in combination with other agents. Hydroquinone, the mainstay of treatment for PIH can be combined with other agents such as retinoids, antioxidants, glycolic acid, sunscreens and corticosteroids to increase efficacy. Azelaic acid is effective for comedonal acne and inflammatory acne as well as hyperpigmentary skin disorders. Azelaic acid (20% cream or 15% gel) is recommended as the first-line treatment for non-inflammatory and inflammatory acne. In patients with Fitzpatrick skin types IV or greater, azelaic acid should be used with caution because of its potential lightening effect. Kojic acid (2-4%) alone or in various combinations is a better option for PIH therapies. Niacinamide is a stable depigmenting agent as it is unaffected by light, moisture, acids, alkalis or oxidizers.

Systemic/oral therapy

When topical agents are inadequate or not tolerated or in cases of moderate to severe acne, especially when the chest, back and shoulders are involved, systemic antibiotics (tetracycline, minocycline, doxycycline, lymecycline, erythromycin or trimetho-prim/sulfamethoxazole) are considered the next line of treatment. Response to oral antibiotics is seen by six weeks of therapy. If control is maintained for several months, the antibiotic may be discontinued gradually and only topical therapy can be continued (Table 3). Systemic antibiotics should not be used to treat mild acne because of the risk of increasing resistance.[4]

Table 3: Effect of antibiotics in acne.

Agents	Effect on acne
Tetracyclines and erythromycin	Reduce propionibacterium acnes within the follicles; thereby, inhibiting production of bacteria-induced inflammatory cytokines
Minocycline and doxycycline	Inhibit cytokines and matrix metalloproteinases, thereby counteracting promotion of inflammation and tissue breakdown

Oral antibiotics are effective in reducing inflammatory lesions, and higher doses can be tried if a patient seeks better control. Doxycycline and minocycline are considered more effective than tetracycline. Erythromycin is reserved for patients in whom tetracyclines are contraindicated (e.g. pregnant women and children <9 years of age), although development of resistance to erythromycin is more common than with the other antibiotics.[4] Isotretinoin is an important nonhormonal and a nonantimicrobial treatment option for adult women with acne. Oral isotretinoin is approved by the food and drug administration (FDA) for treatment of severe recalcitrant acne, but it can also be used to treat patients with moderate acne that is either treatment-resistant or relapses quickly after discontinuation of oral antibiotic therapy. Isotretinoin effectively decreases sebum production, number of acne lesions and acne scarring.[1]

Consensus point 7

Tetracycline treatments, which include minocycline, doxycycline and tetracycline are considered first-line therapy in patients with moderate-to-severe inflammatory

acne. However, doxycycline (dosed at 50-100 mg once daily) is more photosensitizing than minocycline (dosed at 50-100 mg twice daily) and is frequently associated with gastrointestinal disturbances, especially at higher doses. Minocycline can often give rise to vertigo, dizziness, pigmentation and occasionally systemic lupus erythematosus like syndrome. To mitigate these side effects, patients should be advised to use sunscreen lotion and other photoprotective measures to decrease sunburn risk. Patients can also be instructed to take doxycycline with a meal or a full glass of water. Macrolide medications including erythromycin and azithromycin are also used in acne treatment. Azithromycin 500 mg once daily for 3 days/week or in cycles of 10 days for 12 weeks are the most commonly used regimens. Azithromycin has anti-inflammatory and immunomodulatory effects and is a good choice for patients who cannot tolerate other commonly used oral antibiotics. Azithromycin in combination with low dose of isotretinoin is effective in moderate to severe acne. In order to reduce antibiotic resistance and improve efficacy, oral antibiotics should be combined with topical benzoyl peroxide or retinoids. Additionally, the duration of treatment should not exceed by 12 weeks. Experts were of the opinion that if a patient is a good candidate for treatment with isotretinoin, long-term antibiotic treatment is not recommendable.

Oral isotretinoin, the most effective treatment for severe acne, has an effect on all four major pathogenic factors of acne. Isotretinoin is not indicated for treatment of prepubertal acne and is not recommended in patients <12 years of age. Normally, isotretinoin is given over a course of 16-24 weeks. It is necessary to closely monitor patients because of its harmful side-effects. It is recommended to start with a low dose (0.5 mg/kg) for the first 4 weeks to avoid initial flares and then increase to the full dosage of 1 mg/kg per day. Due to its well-known teratogenic effects such as serious craniofacial, cardiovascular, thymic and central nervous system malformations, female patients must demonstrate a negative pregnancy test and must use contraception during the treatment course. Other adverse reactions include chapped skin, dry eyes, epistaxis, myalgias and alterations in serum lipid and transaminase concentrations, most of which are resolved after treatment is stopped. It is advisable to monitor laboratory parameters, primarily liver enzymes and lipids, before treatment, 1-month after starting treatment and every 3 months thereafter. Isotretinoin often causes a flare-up of acne and it can, therefore, be combined with low-dose corticosteroids for a short period of ~1-2 weeks for more severe inflammatory acne. The new micronized variety though said to have lesser mucocutaneous and lipid side effects in practice was not found superior to the already existing brand in the market by most experts.

Hormonal therapy

Hormonal agents provide effective second-line treatment in women with acne, regardless of underlying hormonal abnormalities.[4] These drugs include anti-androgens, both steroidal (spironolactone and cyproterone acetate) and non-steroidal (flutamide), 5-alpha reductase inhibitors (finasteride), corticosteroids, ovarian androgen inhibitors like oral contraceptives, gonadotropin releasing hormone agonists, metformin and other insulin sensitizing agents besides others like cimetidine and ketoconazole.[10,11] Bromocriptine used for idiopathic hyperprolactinemia, has proven effective for managing acne. Bromocriptine treatment provides great improvement in or even disappearance of late onset acne.[12] Hormonal therapy is useful for women with endocrine anomalies and those who have proven unresponsiveness to conventional therapies. Women with androgen receptor hypersensitivity might not have biochemical evidence of hyperandrogenemia but would benefit from hormonal (anti-androgen) therapy.[10] Clinical trials have shown that estrogen-containing oral contraceptives can be helpful. The choice of combined oral contraceptives should be based on patient tolerance, estrogen strength, low androgenetic activity, low mineralocorticoid activity and other potential side effects. Antiandrogen therapy requires at least 3-6 months for significant improvement. Oral antiandrogens, such as spironolactone, can be added if oral contraceptives are not effective.[4]

Consensus point 8

Systemic antiandrogens such as spironolactone and combination oral contraceptive medications are effective acne treatment options. Systemic use of antiandrogens, are limited to women who wish to conceive or have other endocrine disorders or contraindications. Spironolactone, an androgen receptor blocker, is used alone or as an adjunct (with topical agents or oral antibiotics) at doses of 50-200 mg/day. However, patients should be warned about possible dose-dependent side effects, including hyperkalemia, menstrual irregularities, headache, fatigue and breast tenderness. Periodic monitoring of hyperkalemia (in high-risk patients only), blood pressure monitoring and electrocardiography need to be done in special cases. They are highly contraindicated in pregnancy due to hypospadias and feminization of male fetus. It is recommended to use spironolactone with oral contraceptive medications, especially in cases having hirsutism and late-onset acne.

Ethinyl estradiol, a suppressor of ovarian androgen production, is administered from day 1 of the menstrual cycle and administered as 21 days on/7 days off regimen, for 5-6 cycles, after obtaining a negative pregnancy report. Common side effects that usually subside after 2-3 months are breakthrough bleeding, nausea, breast tenderness and weight gain. One must be careful to ask about family history of breast cancer, stroke and migraine as these are seen more with long-term oral contraceptives usage. Cyproterone acetate at a dose of 50-100 mg daily (with or without ethinyl estradiol) prescribed for 3-6 menstrual cycles reports better results in acne patients. Side effects include menstrual abnormalities, breast

tenderness and enlargement, nausea/vomiting, fluid retention, leg edema, headache, liver dysfunction and rare blood clotting disorders. Periodic monitoring of liver function tests is advised. Metformin, given in a dose of 500 mg once to twice daily doses (up to 2000 mg/day), causes side effects of nausea, vomiting, lactic acidosis and vitamin B12 deficiency.

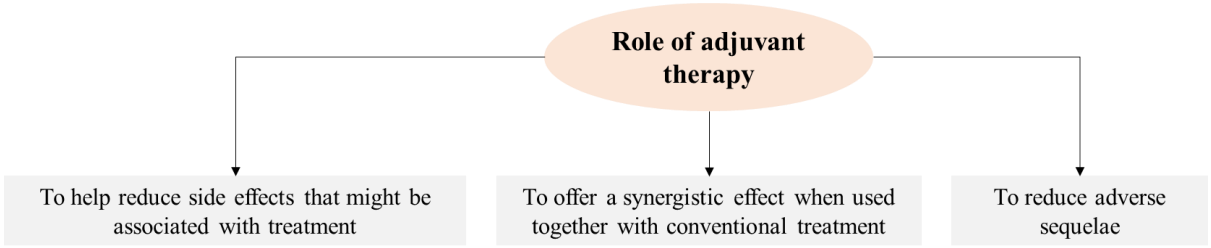

Figure 3: Role of adjuvant therapy in acne management.

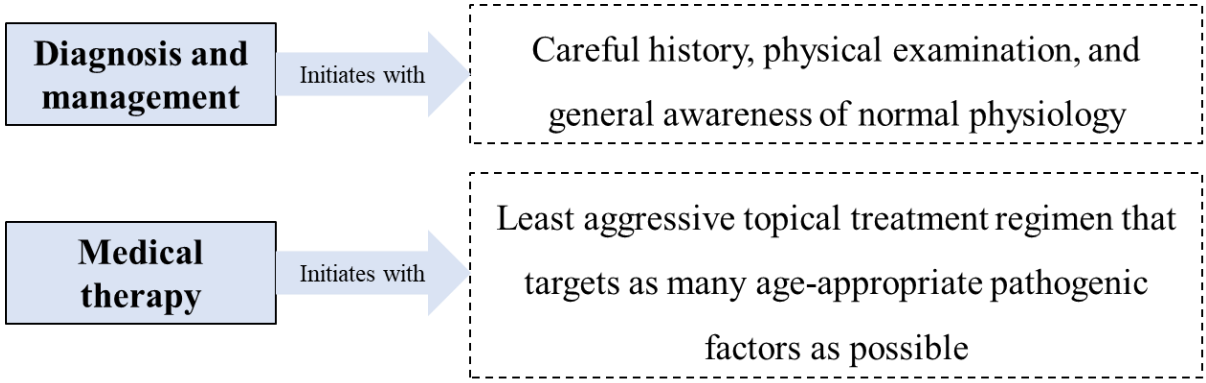

Figure 4: Diagnosis and management of paediatric acne in any age group.

Cosmeceuticals

Cosmeceuticals are topical preparations sold as cosmetics that have typical qualities that support pharmaceutical action. Cosmeceuticals are not always necessary, but can be incorporated as an adjuvant (Figure 3). Cleansers, moisturizers, topical sebum-controlling agents, corneolytics, sunscreens and camouflage are included in the range of cosmeceutical agents.[8]

Consensus point 9

The expert panel recommended the use of gentle soap-free cleansers and non-comedogenic acne-specific moisturizers. Daily use of an oil-free sunscreen is recommended, together with photoprotective behaviors. Moreover, use of an appropriate concealer can help improve the quality of life of patients with acne.

Management of acne in special populations

Pediatric population

Pediatric acne is categorized into four subgroups based on the age of onset-neonatal, infantile, mid-childhood, and preadolescent.[13] Diagnosis and management of pediatric acne is depicted in Figure 4.[14]

Once treatment has been implemented, clinicians must be willing to step-up to systemic therapies, whenever required to prevent acne-related scarring. Treatment-specific side effects should be anticipated and discussed with patients and their families, using patient education as a distinct type of acne intervention.[14]

Pregnant women

Choosing appropriate treatment for pregnant women can be challenging because many acne therapies are teratogenic.[4] Treatment of acne in this population requires safety considerations for both the mother and fetus/infant. Hormonal therapy, tetracyclines, cotrimoxazole and both oral and topical retinoids should be avoided.[8]

Consensus point 10

In most clinical case scenarios, treatment of acne in children is similar to that in adults. As topical therapies may be more irritating in children, initiation with low

concentrations is preferred. For mild acne, benzoyl peroxide alone or in combination with topical antibiotics (e.g. erythromycin or clindamycin) can be appropriate. For children <9 years of age, erythromycin is preferred over tetracyclines as tetracyclines can affect growth of cartilage and teeth. For patients with severe acne, judicious administration of oral isotretinoin is deemed reasonable to prevent further permanent physical and psychosocial sequelae. Treatment with oral isotretinoin should include close monitoring for both clinical and laboratory diagnostics.

For pregnant women with mild-to-moderate acne, topical antibiotics can be used in combination with topical acne agents. Antibiotics (erythromycin, clindamycin), benzoyl peroxide, azelaic acid and salicylic acid are the treatment choices for pregnant and lactating women.

Procedures in acne management

Chemical peels

Chemical peels involve facial resurfacing whereby removal of the epidermis stimulates re-epithelization and skin rejuvenation. Chemical peeling also offers reduction in hyperpigmentation and superficial scarring of the skin. Alpha-hydroxy acids (glycolic acid and lactic acid) and beta-hydroxy acids (salicylic acid) are the most common chemicals used in chemical peels.[7] Chemical peels used alone or in combination with lightening agents can be effective in all skin types, commonly in patients with darker skin tones.[6]

Lasers for acne scar removal

Lasers and light-based therapy are commonly used for treatment of mild to moderate inflammatory acne.[7] These modalities are safe, effective and associated with no or minimal complications when used appropriately. Light and laser sources are also being used in combination with pharmacological and/or physical measures for synergistic action and to optimize treatment outcome.[15]

Microneedling

Microneedling, also known as collagen induction therapy, involves repetitive puncturing of the skin with sterilized microneedles. Many mechanical microneedling devices are registered with the FDA, with the majority being a variation of either the dermaroller or the dermapen. Microneedling offers a minimally invasive tool for the treatment of multiple dermatologic conditions.[16] Radiofrequency microneedling (RFM) is a type of microneedling technique in which each needle releases a radiofrequency current and creates small zones of neocollagenesis that are termed radiofrequency thermal zones. RFM devices propose a safe and effective treatment for acne and acne scars.[17]

Platelet-rich plasma (PRP)

PRP is an autologous preparation that contains a large number of platelets concentrated into a small volume of plasma. PRP when injected into the damaged area causes a mild and local inflammatory response with elevation of a wide range of growth factors such as platelet-derived growth factor, transforming growth factor beta, platelet-derived epidermal growth factor, platelet-derived angiogenesis factor, insulin-like growth factor 1 and platelet factor 4. All of these stimulate physiological wound healing and tissue repair. Thus, PRP is used as an adjuvant therapy for acne scars.[18]

Consensus point 11

When choosing the appropriate peeling agent, physicians must individualize treatment and conduct a complete medical history and skin examination to prevent suboptimal results or complications. Therapies such as minocycline and oral contraceptives, frequently used in patients with acne can cause photosensitivity and predispose patients to hyperpigmentation. Current infection, either bacterial, fungal or viral are contraindications. Herpes simplex virus can be reactivated after peeling and can delay wound healing if prophylactic treatment is not administered before intervention. Chemical peels such as glycolic acid and salicylic acid peels have resulted in significant improvement in the level of lightness from baseline. Superficial chemical peels obtained using trichloroacetic acid or Jessner's solution are efficacious in melasma treatment. Patients should also be advised to avoid sun exposure and use sunscreen after chemical peel treatment.

The role of laser treatment in PIH is reserved for lesions that remain refractory after several months of topical therapy. Lasers in PIH treatment include the Q-switched ruby, pulse dye, fractional CO_2, Q-switched Nd:YAG, and the intense pulsed light (IPL) lasers. In combination with fractional CO_2 laser treatments, IPL therapy reduces inflammatory lesion and atrophic scar scores. Papules, pustules and nodules respond well to therapy using the 1,550-nm erbium glass laser.

For patients currently or recently exposed to isotretinoin, the experts panel supported the statements of the American society of dermatologic surgery (ASDS) guidelines task force that there is no need to delay treatment with superficial chemical peels and non-ablative lasers, including hair removal lasers and lights, vascular lasers and non-ablative fractional devices.

Photoprotection

Treatment modalities in acne have the potential to adversely affect epidermal barrier functions and induce skin inflammation. Many acne therapies lead to thinning of skin and predispose to ultraviolet damage. Ultraviolet

damage itself has been shown to generate free radicals, which has been implicated in acne flares.[19]

Consensus point 12

in those treated with post-acne hyperpigmentation. Sun protection strategies and formulations can only offer the expected protection if applied regularly. Patients should be advised to avoid sun exposure, encouraged to wear protective clothing, and advised to wear broad-spectrum photoprotection, especially when photosensitizing treatment is prescribed. Acne treatment, if topical, should be applied first, followed by photoprotection. The level of sun protection factor should be based on individual skin type, geographic location and type of leisure activity.

General precautions

Patients should be advised to avoid picking the acne, which can lead to trauma, secondary infection and scarring. Skin hygiene such as washing the face to control greasy skin, but not to the level of causing irritation

Photoprotection is important, especially in patients treated with retinoids, doxycycline oral contraceptives or

should be advised. Avoidance of comedogenic moisturisers should be counselled to patients.[20]

Consensus point 13

The experts agreed that the above-mentioned points for skin care are important in acne treatment. They emphasized on the use of mild cleansers, photoprotective agents and moisturizers to augment treatment efficacy.

Role of diet

Diet plays a very important role in acne development. Evidence suggests that high GL diets can exacerbate acne and low glycaemic diet results in the improvement of acne lesions (Figure 5).[2]

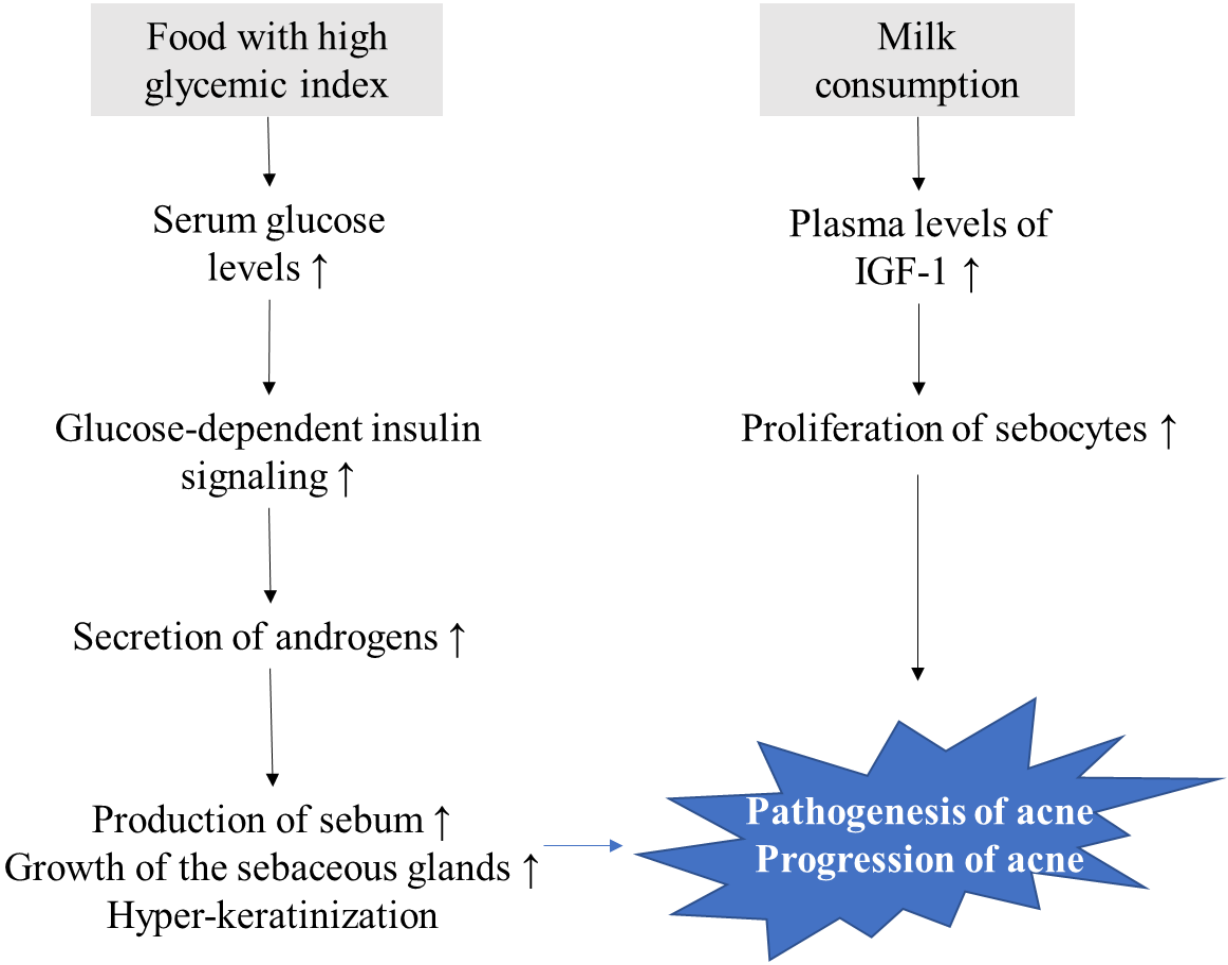

Figure 5: Diet influences acne development.

Food with high glycemic index is rapidly absorbed and increases serum glucose levels, thereby stimulating glucose-dependent insulin signaling. Elevated insulin levels stimulate the secretion of androgens and cause increase in production of sebum, growth of the sebaceous glands, and hyperkeratinization, which plays a fundamental role in pathogenesis of acne. High plasma levels of IGF-1 result from consumption of milk; IGF-1 elevation stimulates proliferation of sebocytes, resulting in the development and progression of acne lesions; IGF-1, insulin-like growth factor 1.

Consensus point 14

Intake of a high glycemic index diet, milk, chocolates and high-fat diet are linked with increased odds of acne presentation. A low-GL diet, typically low in saturated fat and high in whole grains, fruit and vegetables, is a healthy dietary intervention. A low-GL diet may have multiple benefits beyond acne including weight loss and decreasing risk of obesity, cancer and diabetes.

Patient counselling

Patient education is a key aspect of acne management.[5] Clinicians should discuss the medications that are being prescribed and the specific lesions these medications are intended to treat. Instructions on how to take and apply these medications should be provided in simple, easy-to-understand language. It should be emphasized that topical medications need to be applied over the entire affected area rather than just the obvious spots to treat both visible acne lesions and microcomedones.[22]

In addition to knowledge of medication administration, patients need to be prepared for possible side effects and should be instructed on effective management of these side effects. The most common side effect of topical acne medications is dryness or irritation of the skin, which can be minimized by use of moisturizers, cleansing and in some cases, by reducing application frequency (e.g. every other day versus every day).[21]

Consensus point 15

The experts emphasized that patients should be counselled about the likely time scale for improvement and duration of treatment-at least six weeks, maybe even longer. They should be made aware that the improvement generally becomes noticeable after several weeks of therapy. Adherence to treatment can be improved by appreciating patients' perspectives.

CONCLUSION

Acne is a common inflammatory skin disease that has substantial effects on quality of life. Extensive research with respect to the condition itself and potential treatment options are available. This consensus paper presents clinicians' perspective on clinical presentation of acne, determinants of acne, assessment and evaluation of acne and acne management modalities in daily clinical practice. As effective therapies for acne target one or more pathways involved in the pathogenesis of acne, experts opined that the use of combination therapy is beneficial in improving acne and PIH. Experts further emphasized on proper evaluation, assessment, and diagnosis of acne to rule out differential diagnosis. The experts also support the role of patient education and counselling in improving treatment efficacy and treatment adherence.

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