8) आधुनिक आरोग्यविज्ञान
Acne Vulgaris

Definition:

Acne is a chronic inflammatory disease of the pilosebaceous units. It is characterized by the formation of comedones, erythematous papules and pustules, less of frequently nodules or cysts and, in some cases scarring.

Acne, is a very common self-limited, multifactorial disorder involving the sebaceous follicles, is usually first noted in the teenage years.

Lesions may begin as early as 8-10 at sebarche, which in girls may precede menarche by more than a year. Prevalence increases steadily throughout adolescence and then decreases in adulthood. Though girls often develop acne at a younger age than boys.

Natural History:

The condition usually starts in adolescence and resolves by the mid-twenties. Acne develops earlier in females than in males, which may reflect the earlier onset of puberty. Some subjects show small non-inflamed lesions by the age of 8-10 years. A peak in incidence any severity occurs between 14-17 years in women, when 40% are affected and 16-19 years in men, when 35% are affected. Thereafter, the acne resolves slowly, but some patients still have problems worthy of treatment up to the age of 35 years and more. At the age of 40 years, significant lesions are still present in 1% of males and 5% of females. It is not known why acne resolves or why it is more persistent in females.

Four Major Factors:

Four major factors are involved in pathogenesis -
1) Increased sebum production.
2) An abnormality of the microbial flora.
3) Cornification of the pilosebaceous duct.
4) Production of inflammation.
Genetic Factors:

A genetic influence is confirmed by the very high concordance between monozygotic twins, in which the extent and severity of acne and the sebum excretion rate (SER) are virtually identical. Furthermore, in three pairs of identical twins, severe nodulocystic acne developed at approximately the same time in each pair. On the other hand, less than one half of affected dizygotic twins both have acne.

Several studies have shown that genetic factors influence susceptibility to acne. A survey in Germany showed that the acne had been present in one or both parents of 45% of schoolboys with acne, but in only 8% of parents of boys without acne. Similar findings were recorded in a later survey of both girls and boys.

Natal Studies:

Provide an insight into genetic and environmental factors. Acne in black Americans is less evident than in white Americans, who also have more severe acne than Japanese. The incidence of acne is said to be low in Eskimos eating a diet rich in fish, but increases markedly when they change to a 'Western' diet with more saturated fats. Similar changes have been noted in Japanese who emigrate to Hawaii and consume an American style diet.

Etiology - Increased sebum production:

Active sebaceous glands are a prerequisite for the development of acne. Acne patients, male and female, excrete on average more sebum than normal subjects and the level of secretion correlates well with the severity of the acne. Sebaceous activity is dependent on male sex hormones of gonadal or adren al origin. Abnormally high levels of sebum secretion could thus result from high overall androgen production or increased availability of free androgen because of deficiency in sex-hormone-binding globulin. Equally, they could involve an amplified target response mediated either through 5α-reduction of testosterone or the capacity of the intracellular receptor to bind the hormone.
There is general agreement that plasma testosterone levels are not abnormally high in males with acne. In females with acne the situation is more complicated. Some investigators have found testosterone levels to be normal whilst others have found raised levels.

Darley and co-workers found high testosterone in 26%, low SHGB in 45% and high prolactin in 45% of 38 women with acne. However, 24% of the total had no hormonal abnormality.

Thus androgenic hormonal balance is disturbed in 50-75% of female acne patients. However, this does not establish that it is the critical factor, and at least a quarter of all cases remain unexplained. No correlations between sebum excretion rate and either total testosterone or SHGB were revealed when these were measured simultaneously in 52 hirsute women.

Conclusions are supported by clinical observations. There is no correlation between severity of acne, hirsutism and menstrual irregularity.

The fact that acne does not occur simultaneously on all susceptible sites is consonant with the finding that sebum excretion varies from follicle to follicle.

Polysystic ovarian syndrome is the most frequently associated hormonal disease, presence of ovarian cysts does not relate to the severity of the acne.

Finally, the possibility that other hormones affect the sebaceous glands either directly or by enhancing their response to androgens should not be neglected.

Sebum consists of a mixture of sequalene, wax and sterol esters, cholesterol, polar lipids and triglycerides. As the sebum moves up the duct, bacteria, especially Propionibacterium acnes, hydrolyse the triglycerides to free fatty acids. The role of individual lipid components in causing acne is uncertain. They may be involved in ductal hypercornification or may be essential to the growth of bacteria.
Ductal hypercornification:

Acne patients show ductal hypercornification, which produces blackheads and whiteheads. There is a significant correlation between the severity of acne and the number and size of follicular casts, which are a measure of comedogenesis.

The reason for this ductal hypercornification is unclear. Biopsy and culture of early non-inflamed lesions has shown that 30% of these are without bacteria, suggesting that ductal bacteria are not needed for the initiation of cornification.

Acne and bacteria:

The propionibacteria are anaerobic to facultative Gram-positive non-sporing bacilli of typical diphtheroidal cellular morphology. Indeed, these organisms were formerly placed in the genus Corynebacterium. They are associated with a variety of habitats including the bodies of man and other animals and with dairy products. Of the eight described species only two - P. acnes and P. avidum - are commonly encountered in clinical material.

Propionibacterium acnes:

P. acnes is widely distributed on the adult human skin and hair, and in the oropharynx and gastrointestinal tract, a ubiquity that explains its common occurrence as a clinical and laboratory contaminant.

Morphology:

P. acnes is a Gram-positive bacillus, about 0.5-1.5 x 1-10 μm in size. The organism shows a typically diphtheroidal pleomorphism with clubs, 'tadpole' forms, short bifid and branched elements and coccal forms.
**Cultural Characteristics**

P. acne is anaerobic to facultatively anaerobic in its atmospheric requirements. A small proportion of strains grow aerobically on primary isolation. The majority of fresh isolates grow initially only in an anaerobic atmosphere, but may show facultatively anaerobic growth after several transfers. About one-third of strains are found to be carbon dioxide-dependent rather than anaerobic on primary isolation.

Colonies on horse blood agar are about 0.5-2 mm in diameter after 48 h incubation, circular, entire, convex, greyish-white and opaque, with a glistening surface. A few stains are haemolysic.

**Biochemical characteristic**

P. acne ferments glucose, fructose, lactose, mannose and glycerol; maltose, lactose and sucrose are not attacked, and aesculin is not hydrolysed. The organism is proteolytic, producing both a glatinase and a caseinolytic enzyme; it produces indole and reduces nitrate. About two-thirds or strains show catalase activity after exposure of surface colonies to air for about 30 min. Variability in reaction which is not uncommon, may be reduced by the addition of 0.025% Tween 80 to the media; Tween 80 simulates the growth of the organism. Like other propionibacteria the major products of metabolism are propionic and acetic acids.

P. acne produces a number of soluble enzymes including a lipase which is active against triglycerides but inactive against the fats in egg yolk (the organism is egg yolk negative).
Pathogenicity

The ubiquity of *P. acne* on the normal human body ensures that the organism is commonly recovered from anaerobic cultures of clinical materials, most frequently as an incidental contaminant. The organism has aroused considerable interest as a major contributor to the complex pathogenesis of acne. It has been suggested that the lesions of acne are initiated by pilosebaceous duct obstruction and a local irritant effect of long chain fatty acids derived from bacterial hydrolysis of lipids in the sebum.

Acne is not infection. The dermal inflammation is not caused by bacteria. The earliest structural changes in blockage of the opening of the pilosebaceous follicle by a mass of keratin. Which is dark because of melanin deposition. Secretion of sebum continues in the blocked follicle until the sebaceous gland undergoes pressure atrophy. Meanwhile the follicle may become grossly dilated with keratinous debris.

The precise factors which induce inflammation in acne lesions are unknown.

Extensive investigation has failed to elucidate the basis of acne; the influence of androgens on sebum production may be important, and the tissue reaction is probably aggravated by the fatty acids produced by bacterial enzymic activity on sebum.

Clinical Features:

Acne is a polymorphic disease which occurs predominantly on the face (99%) and, to a lesser extent, on the back (60%) and chest (15%). In young men it affects mainly the face, and in older males the back. Seborrhoea is an almost universal feature. Non-inflamed lesions (comedones) are more frequent in the younger patients and consist of blackheads (open comedones), in which the black colour is due to melanin not dirt, whiteheads (closed comedones) and the so-called intermediate non-inflamed lesions
which show features of both blackheads and whiteheads. Inflammatory lesions may be superficial or deep and some arise from non-inflamed lesions. The superficial lesions are usually papules and pustules, and the deep lesions are deep pustules and nodules. Often forgotten is the macule, a lesion well on the way to regression, but one which can last for many weeks and contribute markedly to the general inflammatory appearance.

Classification of lesions is arbitrary and the types may merge. Nodules, especially if exudative or haemorrhagic, and cysts are particularly disfiguring. They may extend over areas of a few to many centimetres and the nodules may be remarkably deep with very little surface involvement. Sinus formation between nodules. The deeper inflammatory lesions are often associated with scarring. Pyogenic granulomata develop very infrequently.

The exact incidence of scars is not known but it is decreasing with improved therapy. Scars may show increased collagen (hypertrophic scars and keloids). Keloids are least common and are most prevalent on the trunk. Superficial and deep, soft scars may improve with time. A common type of scarring on the back and chest consists of relatively inconspicuous small, follicular, macular atrophic lesions.

A rare complication of scarring is calcification. A common feature of darkly pigmented skin is the relatively persistent postinflammatory pigmentation.

Other factors affecting acne:

There are many myths about factors which might help of aggravate acne.
Diet

A wealth of folklore has blamed acne on certain foods, in particular, chocolate and pork fat, but scientific proof is lacking. Chocolate, for example, appears to have no significant influence. Dietary restriction resulting in marked weight loss reduces seborrhoea but cannot be considered as routine treatment.

A computerized study of 100 acne patients found no link between acne severity, caloric intake, carbohydrate, lipids, proteins, minerals, amino acids or vitamins.

A survey by the Food and Nutrition Board of the National Research Council recently showed that 40 percent of boys between 13 and 19 years of age and 60 percent of the girls in the same age group subsisted on diets that were substandard. Generally, the young people surveyed had abandoned the eating routines of their families. They habitually skipped breakfast and failed to make up the nutritional loss during other meals.

Iron is needed for the formation of hemoglobin, the substance that gives red blood cells their red coloration and is responsible for the transport of oxygen and carbon dioxide in the bloodstream.

Sulphur is needed by the body for hair, skin, nails, and cartilage, and is available by eating nearly any protein foods.

Sodium is required for muscle activity and normal body fluid balance, and can be obtained by using ordinary table salt on foods.

Iodine is needed for normal thyroid control of body metabolism, and is supplied in the form of iodized table salt.

Potassium is a tonic for the nervous system and the muscles, and is available in adequate amounts in most kinds of meats.

Magnesium collaborates chemically with calcium and phosphorus for normal muscle and nerve function, and is found in most forms of protein.
Premenstrual flare:

About 70 to 80% of women complain of a flare 2-7 days premenstrually. It is unlikely that any possible variation in sebum excretion during the menstrual cycle could be substantial enough to explain the flare. Possibly it is related to a premenstrual change in the hydration of the pilosebaceous epithelium. Progesterone and oestrogen also have both pro and anti-inflammatory effects.

The sebaceous duct orifice may become smaller between days 15 and 20 of the menstrual cycle, leading to increments in duct obstruction and resistance to flow of sebum. Many of these women tend to do well on anovulatory drugs.

Sweating:

Up to 15 of acne patients notice that sweating causes a deterioration in their acne, especially if they live or work in hot humid environment e.g. as a cook. Ductal hydration may be the responsible factor.

Ultra Violet Radiation:

Patients and doctors alike accept that natural sunlight often improves acne but there is no scientific evidence that it does. The cosmetic effect may be the entire explanation. Artificial UV radiation appears to be less satisfactory than natural radiation.

Stress and acne:

It is unlikely that stress alone induces the formation de novo of acne lesions. However, acne itself induces stress and 'picking' of the spots will aggravate the appearance. This is particularly obvious in young females who present with acne excoriés. Studies have shown that many acne patients experience shame (70%), embarrassment and anxiety (63%), lack of confidence (67%), impaired social contact (57%) and a significant problem with unemployment. Severe acne may be related to increased anger and anxiety.
Occurrence -
Hydration of the ductal stratum corneum may induce acne in such occupations as catering. Patients dealing with oil inevitably develop an acneiform oil folliculitis, particularly on their trunks and limbs.

Cleanliness -
Although surface dirt does not cause acne, it can contribute to its spread. Therefore, the affected areas should be cleansed with a medicated soap and hot water twice a day. Hair should be shampooed frequently and brushed away from the face.

Differential diagnosis -
Acne is rarely misdiagnosed. The commonest mistaken diagnosis is rosacea, which occurs in an older group, lacks comedones, nodules, cysts or scarring. In females, confusion with perioral eczema. Acneiform drug eruptions can be misdiagnosed.

Acne grading -
Grading is very helpful in the assessment of acne in the clinic. A good light and palpation, as well as inspection, are required. The acne can be graded on a 0-7 scale on the face, back and chest. Little practice is required to become reasonably efficient, and it does not matter if the grading used is somewhat different from those techniques published, so long as the observer is consistent.

Treatment -
Control of acne is an ongoing process. All acne treatments work by preventing new acne. Existing blemishes must heal on their own. Improvement takes time. If your acne has not improved after 6 to 8 weeks, you may need a change in your treatment.
Untreated acne can leave lifelong scars. While not a life threatening condition, acne can be upsetting and disfiguring. When severe, acne can lead to serious and permanent scarring. Even less severe cases can lead to scarring.

**Oral Therapy**

The main oral treatment for acne is with antibiotics, although dapsone, zinc sulphate, clofazimine and vitamin A acid are very occasionally used. Isotretinoin and hormonal preparations which are also used.

Tetracyclines, Doxycyclin remain the antibiotic of choice but erythromycin is preferable in the female who is or might become pregnant. Trimethoprim which is equally effective can be reserved as a third-line antibiotic.

Not all patients respond in the same way, e.g. young males with a marked seborrhoea and truncal acne respond less well than females with facial acne. Patients who require antibiotics should be given 1 g per day of tetracycline or erythromycin. Oral tetracycline and erythromycin are both very safe.
Tropical Treatment:

The most widely used topical therapies are Benzoyl Peroxide, vitamin A acid and antibiotics.

Acne Care:

Follow the full treatment prescribed by your medical advisor. In addition you can:

1] Wash your face two times a day with a gentle soap. Change your washcloth every day. Wash as soon as possible after you exercise & come back from outside.
2] Wash your hands more frequently and avoid putting your fingers and hands to your face unnecessarily. Don't squeeze, pick, scratch, or rub your skin. Scars may form if you squeeze pimples. Don't rest your face on your hands while you read, study, or watch T.V.
3] Shampoo your hair at least twice a week. Pull your hair away from your face when you sleep. Style it away from your face during the day.
4] Keep a record of the foods you eat and try to figure out if any foods make your acne worse. Avoid foods high in fat like chocolate, nuts, peanut butter, cheeses, potato chips, and popcorn if they seem to make your acne worse.
5] Avoid working in hot kitchens where oily foods are cooked.
7] Avoid extreme stress if possible. Practice stress reduction strategies such as exercise, meditation, and counseling if stress is extreme.
8] Get physical exercise regularly.
9] Keep your follow-up appointments with your doctor. Keep a record of what has been tried and how it has worked. There are many alternatives for you and your doctor to try, so don't give up!
**Acne Myths and Misconceptions**

**Myth 1** - Acne is caused by poor hygiene. If you believe this myth, and wash your skin hard and frequently, you can actually make your acne worse. Acne is not caused by dirt or surface skin oils. Although excess oils, dead skin and a day's accumulation of dust on the skin looks unseemly, they should not be removed by hard scrubbing. Vigorous washing and scrubbing will actually irritate the skin and make acne worse. The best approach to hygiene and acne: Gently wash your face twice a day with a mild soap, pat dry and use an appropriate acne treatment for your skin.

**Myth 2** - Acne is caused by diet. Extensive scientific studies have not found a connection between diet and acne. In other words, food does not cause acne. Some people insist that certain foods affect their acne. In that case, avoid those foods. Besides, eating a balanced diet always makes sense. However, according to the scientific evidence, if acne is being treated properly, there's no need to worry about food affecting the acne.

**Myth 3** - Acne is just cosmetic disease. Yes, acne does affect the way people look and is not otherwise a serious threat to a person's physical health. However, acne can result in permanent physical scar-plus, acne itself as well as its scars can affect the way people feel about themselves to the point of affecting their lives.

**Myth 4** - You just have to let acne run its course. The truth is, acne can be cleared up. There is no reason why someone has to endure acne or get acne scars.