BLUE LIGHT THERAPY IN TREATMENT OF ACNE VULGARIS

Thesis

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INTRODUCTION

Acne vulgaris is one of the most prevalent and potentially physically and emotionally debilitating dermatologic diseases. It affects approximately 40 million adolescents and 25 million adults and accounts for more than 30% of all visists to the deramtologist ***(Leyden, 2003).***

It is a chronic inflammatory disease of the pilosebaceous unit resulting from androgen-induced increased sebum production, altered keratinisation, inflammation, and bacterial colonisation of hair follicles on the face, neck, chest, and back by Propionibacterium acnes (P.acnes). Although early colonisation with P.acnes and family history might have important roles in the disease, exactly what triggers acne and how treatment affects the course of the disease remain unclear. Other factors such as diet have been implicated. Facial scarring due to acne affects up to 20% of teenagers. Acne can persist into adulthood, with detrimental effects on self-esteem ***(Williams et al, 2012).***

Acne is conventionally treated with a variety of topical and oral therapies that introduce a considerable number of short-term and potentially significant long-term consequences***(Longshore and Hollandsworth, 2003).***

An increasing number of laser, light-based, and radiofrequency device manufacturers are addressing the need for efficacious and safe acne treatments with minimal downtime, made possible through an evolving understanding of laser-tissue interaction involving (P.acnes)-produced porphyrins and the development of deep-penetrating infrared nonablative lasers, which affect sebaceous glands***(Elman et al, 2003).***

The main aim of these new and photo-based therapies, is to avoid the slow effects and the frequent irritation produced by available topical treatments. Additionally, oral therapies may be associated with increased bacterial resistance (antibiotics) or possible severe side effects (oral isotretinoin). In vitro and in vivo exposure of P. acne bacteria to 405-420 nm ultraviolet (UV) free blue light results in the photo-destruction of these bacteria through the effects on the porphyrins produced naturally by P.acne ***(Cunliffe et al, 2000).***

AIM OF THE WORK

The aim of this work was to determine the effect of blue light therapy with wave length 405-420 nm for the treatment of inflammatory lesions in patients with Acne Vulgaris.

REVIEW OF THE LITERATURE

Clincal features

Acne, a disease of the pilosebaceous unit, appears in males and females who are near puberty, and it may affect older individuals. The intensity and duration of activity vary for each individual. The disease may be minor, with only a few comedones or papules, or it may occur as the highly inflammatory and diffusely scarring acne conglobata. The most severe forms of acne occur more frequently in males, but the disease tends to be more persistent in females, who may have periodic flare-ups before menstrual periods, which continue until menopause ***(Simpson et al., 2011).***

Acne lesions

Acne lesions are classically divided into inflammatory and non-inflammatory lesions. Non-inflammatory lesions consist of open and closed comedones. Inflammatory acne lesions are characterized by the presence of one or more of the following: papules, pustules, and nodules (cysts). Papules are less than 5 mm in diameter. Pustules have a visible central core of purulent material. Nodules are greater than 5 mm in diameter. Nodules may become suppurative or hemorrhagic. Suppurative nodular lesions have been referred to as cysts because of their resemblance to inflamed epidermal cysts. Recurring rupture and reepithelialization of cysts leads to epithelial-lined sinus tracts, often accompanied by disfiguring scars ***(Habif, 2010).***

The primary site of acne is the face and, to a lesser degree, the back, chest, and shoulders. On the trunk, lesions tend to be concentrated near the midline. Although one type of lesion may be predominant, close observation usually reveals the presence of several types of lesions ***(Zaenglein et al., 2008).***

Comedonal acne is the earliest type of acne and is usually non-inflammatory comedones ("blackheads" and "whiteheads"). It develops in the preteenage or early teenage years and is caused by increased sebum production and abnormal desquamation of epithelial cells. There are no inflammatory lesions because colonization with *P. acnes* has not yet occurred ***(Habif, 2010).***

Nodulocystic acne includes localized cystic acne (few cysts on face, chest, or back), diffuse cystic acne (wide areas of face, chest, and back), pyoderma faciale (inflamed cysts localized on the face in females), and acne conglobata (highly inflammatory, with cysts that communicate under the skin, abscesses, and burrowing sinus tracts).

Scarring can be a complication of both inflammatory and noninflammatory acne. There are four general types of acne scars, namely; ice pick, rolling, boxcar, and hypertrophic. Ice pick scars are narrow, deep scars that are widest at the surface of the skin and taper to a point in the dermis. Rolling scars are shallow, wide scars that have an undulating appearance. Boxcar scars are wide, sharply demarcated scars. Unlike ice pick scars, the width of boxcar scars is similar at the surface and base. In rare cases, especially on the trunk, the scars may be hypertrophic ***(Zaenglein et al., 2008).***

Grading of acne lesions

Methods of measuring the severity of acne vulgaris include simple grading based on clinical examination, lesion counting, and those that require complicated instruments such as photography, fluorescent photography, polarized light photography, video microscopy and measurement of sebum production. The two commonly used measures are grading and lesion counting. Grading is a subjective method, which involves determining the severity of acne,

based on observing the dominant lesions, evaluating the presence or absence of inflammation and estimating the extent of involvement. Lesion counting involves recording the number of each type of acne lesion and determining the overall severity ***(Adityan,et al., 2009).***

Mild pustular and papular inflammatory acne is defined as fewer than 20 pustules. Inflammatory lesions occur in comedones after proliferation of P. acnes . Papules or pustules with a minimum of comedones may develop after comedonal acne**,**Patients who have ***moderate to severe acne*** (more than 20 pustules) are temporarily disfigured. Their disease may have been gradually worsening or may be virulent at the onset. The explosive onset of pustules can sometimes be precipitated by stress. There may be few to negligible visible comedones. Affected areas should not be irritated during the initial stages of therapy ***(Habif, 2010).***

Pillsbury et al., (1956) published the earliest known grading system. The grading includes the following: ***(Witkowski and Parish, 2004).***

Grade 1: Comedones and occasional small cysts confined to the face.

Grade 2: Comedones with occasional pustules and small cysts confined to the face.

Grade 3: Many comedones and small and large inflammatory papules and pustules, more extensive but confined to the face.

Grade 4: Many comedones and deep lesions tending to coalesce and canalize, and involving the face and the upper aspects of the trunk.

Michaelsson et al.,(1977) counted the number of lesions on the face, chest and back. They gave a different score to each lesion type. Comedones were valued at 0.5; papules, at 1.0; pustules, at 2.0; infiltrates, at 3.0; and cysts, at 4.0. By multiplying the number of each type of lesion by its severity index and adding each product, these authors obtained a total score that represented the severity of the disease for each visit. This grading system has been criticized on the grounds that scores ascribed to lesions are non-parametric, whereas absolute counts are a parametric data and it is probably wrong to mix these two types of data.

Cook et al.,(1979) evaluated the overall severity of acne on a 0-8 scale anchored to photographic standards that illustrate grades 0, 2, 4, 6 and 8. In addition to the photographic standards, a nine-point scale for comedones, papules and macules over the face was used in conjunction for more sensitivity**.**

Burke and Cunliffe.,(1984) presented the Leeds technique. They described two scoring systems. The first is an overall assessment of acne severity for use in routine clinic and the second, a counting system for detailed work in therapeutic trials. A scale of 0 (no acne) to 10 (the most severe) was used for grading. The groups 0 to 2 were divided into subgroups, by 0.25 divisions. Grades 0.25 to 1.5 represented patients with physiological acne or "acne minor" and those with grades of 1.5 or more have clinical acne or "acne major.

In 1996, Lucky et al., assessed the reliability of acne lesion counting. Acne counts were recorded on a template divided into five facial segments: Right and left sides of the forehead, right and left cheeks and chin. The nose and the area around it were excluded. Counts of each lesion type were recorded within each segment of the template. Total lesion count, along with total inflammatory lesions and comedonal counts, were then calculated. They concluded that reliability of acne lesion counting was excellent when performed by the same trained rater over time**.**

In 1997, Doshi et al., devised a global acne grading system (GAGS). This system divides the face, chest and back into six areas (forehead, each cheek, nose, chin and chest and back) and assigns a factor to each area on the basis of size**.**

In 2008, Hayashi et al., used standard photographs and lesion counting to classify acne into four groups. They classified acne based on the number of inflammatory eruptions on half of the face as 0-5, "mild"; 6-20, "moderate"; 21-50, "severe"; and more than 50, "very severe"**.**