

APPLICATION ON OF HELIOTHERAPY IN THE TREATMENT OF ACNE VULGERIS AND JAUNDICE

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Abstract- The sun light has been proven well in the treatment of many diseases of human being. From last 10 years, lasers and light based system have become a common source of treatment for a wide variety of skin-related ailment which includes treating acne vulgaris. Ultra violet light which comprises a small portion of sunlight is therapeutically useful. Photo therapy uses ultraviolet irradiations with or without exogenous photo sensitizers. Generally in India photo chemotherapy and narrowband UVB are widely used to treat skin related problems. In addition to skin disease treatment, phototherapy or heliotherapy is well practiced in treating baby jaundice which is a life threatening disorder in new born. Jaundice is a multifactorial disorder with many symptoms. Yet another important application of heliotherapy is that it relieves the muscular pain and it heals the wound. Lasers are generally used in these types of treatments. This review tells us about the treatment protocol and various modalities of treatment by phototherapy.

Keywords:—phototherapy,wavelength,precaution, clinical applications, jaundice.

1. INTRODUCTION

Photo therapy uses ultraviolet irradiation without exogenous photo sensitizers. Light therapy or phototherapy it is also referred as heliotherapy. It basically consists of exposure to daylight or to specific wavelengths of light using polychromatic polarized light, laser's light emitting diode fluorescent lamps full spectrum light. The light is administered for a prescribed amount of time and in some cases at a specific time of day the common use of the term is associated with the treatment of skin disorders. Like acne vulgaris, and neonatal jaundice. Light therapy is also used in retina of eye and is basically used to treat diabetic retina therapy. the treatment involved with phototherapy is exposing the skin to ultraviolet light .the exposure may be a small area of the skin or whole body surface. the most common treatment is with narrowband uvb (Nb-uvb) of wavelength 311-313nanometer[1]. Light therapy is considered one of the best monotherapytreatment for atopic dermatitis .research done by American canarsociety.it tells that there is some evidence in helping to treat certain kinds of skin cancer. Photo dynamic therapy is used to treat certain superficial non-melanoma skin cancers. The light therapy heat has a long history in both western and Indian medicines these light has a long history in both western and Indian medicines these light therapy have been used to treat a wide variety of skin related conditions like acne vulgaris. Many ancient cultures practiced various forms of heliotherapy. Finsen is the father of modern phototherapy he developed the first artificial light source for this purpose. He thought the beneficial effect was due to ultraviolet light killing bacteria. Finsen also used red light to treat smallpox[2]. He received the Nobel Price in physiology medicine in 1903.The survey which have been taken recently suggest that 40million American adolescence and 25million adults are affected by acne photo inducing therapy is used to treat some sort of dermatitis problem by using ultraviolet radiations. The following review tells about the new update in the field of phototherapy and the role in which the light plays in the Techniques available to a medical practitioner for treatment of acne. The following review consists study of light in living organism, and different wavelength used for treating acne.

2. ETHICS IN ACNE LIGHT THERAPY

Skin absorbs a molecule named as chromophore. Every study of light in living organism starts where the light energy is observed or selected by these chromophores. Each chromophore has its own absorbing spectrum.at the end of absorption the chromophore changes from its stable state to the excited state.This unstable condition provokes the chemical reaction and photo product. generally in humans their skin consists of chromophore they are photo dynamically active and photo instable substance.an gram-positive microaerophilic skin bacterium propionic bacterium acne is implicated in the pathophysiology of acne vulgaris in its normal metabolism process p acne produce porphyrins mainly proto porphyrin and photo sensitizers coproporphyrin. Photo sen sensitizers are nothing but a molecule which have the trait of absorbing light energy they use this energy to carryout general chemical reaction in cells as well as body tissues. Photo sensitizer has its own proper wavelength of absorption and a wavelength of emission. Excitation of the porphyrins are done by absorption of light causes the formation of singlet o_2 and relative radicals porphyrin present are a class of naturally occurring components consisting of the porphyrin structure of four pyrrole rings they are connected by methane bridges which are of cyclic configuration and variety of side

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chain are attached to them they are usually metallated. in porphyrin-visible absorption spectra the aromatic macrocycle shows highly intense absorption in about 400nm. It is defined as the highest peak of light absorption. The location of this is in blue and ultraviolet range. The ability to produce desired result of p acnes photo inactivation is always determined by the rate at the which the porphyrin molecules are excited. There are some common parameters of photo biological process in order to produce desired result. The general parameters are concentration of proton, temperature, and wavelength of protons. If the above parameters are limited then it may alter p acnes photo inactivation efficiency. A general study explains that phototherapy with mixed bluered light, probably by combining antibacterial and anti-inflammatory action, is an effective means of treating acne vulgaris of mild to moderate severity, with no significant short-term adverse effects [3].

3. LASER AND PHOTOTHERAPY TREATMENT

Ancient times there were many types of light sources they were introduced in the hope to treat and improve acne symptoms. The general light source include halogen, tungsten lamp and nowadays lasers are also prominently used. In 1924, Passow and Rimpau found a higher photodynamic inactivation rate in gram-positive bacteria versus gram negative bacteria. The treatment of acne started with a conventional lamps and there outputs was defined by the use of filters. The main disadvantage of this method was calculating the delivered light source was difficult. Nowadays a newly developed high intensity, enhanced, narrowband, blue light source is introduced or mild to moderate acne. The apparatus generally uses high intensity 400-w a metal halide lamp pulse double ultraviolet cut filters with the emitting pack of 407 to 420nm which produces 90mw/cm². The homogenous illumination is over an area of 20 × 20cm². These illumination totally destroys the p acne bacteria in facial, back, chest. it usually targets the porphyrins in the bacteria. Porphyrins are nothing but a group of heterocyclic and macro cyclic compounds. There is another light based acne clearance this system is called broad spectrum lamp light source. The broad spectrum uses yellow and green band they allow greater skin penetration but it has lower q band [4].

4. WAVELENGTH USED IN TREATMENT OF SKIN

Sun exposure has some beneficial effect on acne symptoms yet it was not clear with wavelengths contributed this favorable effect. Later UVA, UVB treatment was found to have a marginal beneficial effect. The main limitation of phototherapy is that the photons should have to go deep through the epidermis before it can reach the area necessary for the activation of the porphyrins. It has a wavelength about 407-420nm pulse light has strongest porphyrin photoexcitation coefficient however it has poor depth of skin penetration. When compared to blue light red light has a deeper penetration inside the skin.

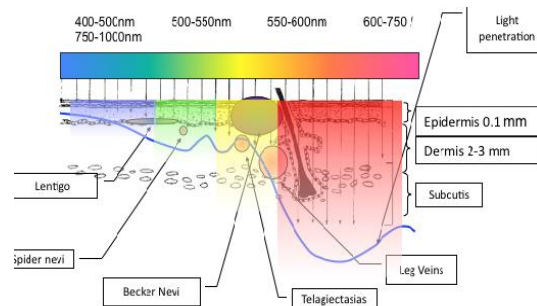


Figure 1. Wavelength used in photo inducing therapy

Nowadays in phototherapy the blue-red light are mixed they combine antibacterial and anti-inflammatory action it is an effective means of treating acne which is of mild to moderate conditions. Sigurdsson et al found that all full spectrum green and violet light sources improved the acne leading to 14% acne lesions clearance. According to the study among other light violet light is to be most effective.

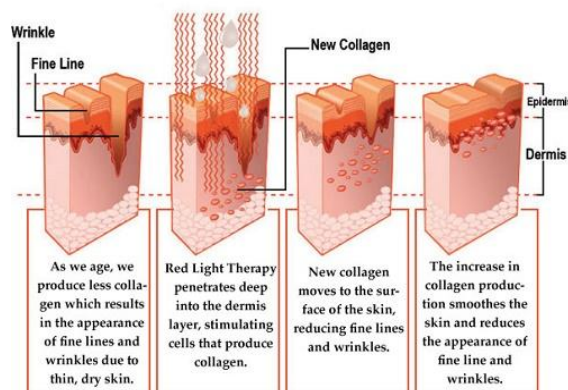


Figure 2. Red Light Therapy

5. PROMINENT CLINICAL PRINCIPLES

Patients considered with inflammatory acne light therapy can be treatment of choice. The general criteria or therapy include acne type & severity. Before treating a patient, the treatment area of a patient should be cleaned with soap and water then the skin surface is dried with a soft cloth. Generally a single treatment usually last up to 20 to 25 minutes. Some light sources does not require any physical contact with affected area at treatment. But some other laser and light sources generally require the skin contact during the treatment. When the treatment is started the patient lies down in a comfortable bed. While the treatment the eyes of the patient should be protected with dark glasses. From the survey clinics have reported improvement after the second week of treatment many cases shows prominent evidence at two to three weeks after the eighth treatment. The new arm therapy which is being studied in several centers around the world it is the effective of combined light – drug therapy. Light therapy is useful as a preliminary treatment in case where the physician would like to reduce the dose of isotretinoin. The affected area are generally the face, back, chest etc. when there is a acne in back side then problem may arise in applying tropical cream this application is difficult and this situation light therapy is more preferable.



Figure 3. Clinical analysis

6. INFANT JAUNDICE

Jaundice is generally defined as yellow tongue. Bilirubin is a waste product that is present in the bloodstream after iron is removed from hemoglobin in red blood cell. When there is excess of bilirubin it generally leaks into surrounding tissues saturating them with this yellow substance. The color of the skin varies with the amount of Bilirubin present. Phototherapy is the most common treatment used for reducing high bilirubin levels that causes jaundice in a new born baby[4]. In standard form of phototherapy baby lies in the enclosed plastic crib or incubators and it is exposed to type of fluorescent light that is absorbed by the baby's color may change from its normal color it is because of the UV rays that is been absorbed by the baby's skin it is not permanent but it will take time to return to its original color.

7. LED PHOTOTHERAPY IN TREATING JAUNDICE

Phototherapy is widely used for treating jaundice, which is a common condition in new born infants they are caused by high level Bilirubin. The major symptoms of jaundice in new born babies are that they have a yellowing of skin and the whites of eye. The above stated condition is almost seen in 70% of newborn, the treatment of phototherapy trans Bilirubin is changed to cis Bilirubin isomer. The phototherapy has some certain wavelength in order to be effective and the wavelength is around 450nm of the light spectrum the general light which corresponds to the wavelength is blue color. Super LED have an abrupt termination of irradiance from the infrared and ultraviolet wavelength rays reducing the undesired effects to the infant skin. Super LED uses very low power consumption and heat, when compared with other light sources.



Figure 4. Led photo inducing therapy

8. CHARACTERISTIC OF PRODUCT

Its size is almost (23.5cm * 11.5cm) its energy consumption is low it has an advanced blue spectrum irradiation. It generally reduces the effect of infrared and ultraviolet rays. It is easy to access radiation intensity can be adjusted according to the necessities [5].

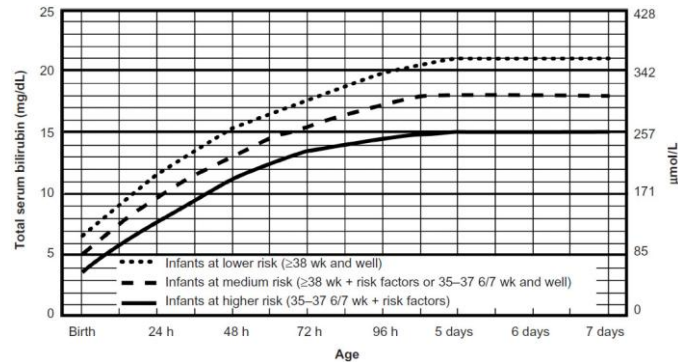


Figure 5. Led wavelength graph

9. PHOTOTHERAPY FOR WOUND HEALING AND PAIN RELIEF

Consisting of living cells phototherapy can be classified into primary, secondary, tertiary. During primary reaction the photons reaches the mitochondria which is generated by laser. Chromophores absorbs the photons energy and further it is converted into kinetic energy this causes changes in membrane cell permeability this reaction increases atp more which further leads to normal skin functions. During secondary reaction the above mentioned primary reaction is amplified. In tertiary effect cells are induced at the cell of secondary events. Energized cell communicate with each other. Some of the basic aspects are lasers wavelength power energy density etc. phototherapy not only clears wound healing such as ulcers, prolonged pressure on skin but it also treats burns, post-operative wounds. For wound healing and superficial skin conditions a visible light probe which has a penetration depth of few millimeters about 0.5-50m is used .a 660nm probe is also used for superficial wound healing. When a wounded area requires a deeper effect with reduce time with larger wounds or burns there large clusters probes are used. Wound which is of medium depth the probe is pressed against the skin. For ulcer wounds the laser is held at 1-2cm away from the wound. Nussaum et al reported that wavelength of 630nm enables the act of bacteria in relaxed way. Acute wound should treated daily while the chronic wound is treated 1-2 times in a week. Light emitting diode therapy (LEDT) can alter muscle performance, fatigue development and biochemical markers for skeletal muscle recovery in an experimental model of biceps humeri muscle contractions [5].

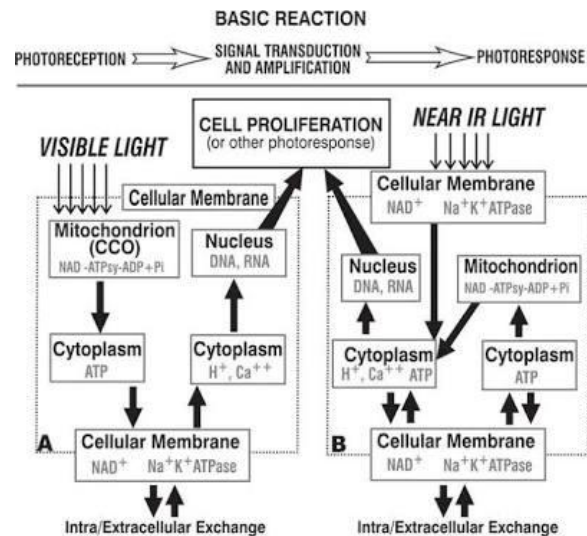


Figure 6. Muscle reaction during photo inducing therapy

10. PHOTOTHERAPY FOR MUSCULOSKELETAL PAIN RELIEF

Generally in phototherapy of musculoskeletal area soft tissue injury repair is done .this therapy provides relief for post fracture pain, pain at origin etc. here In this therapy an infrared probe has a penetration depth of several centimeters .the most commonly used diode for this therapy is GAAIAS diode that emits coherent light in infrared waveband usually the bandwidth used is about 820-840nm with an continuous output power of 60 mv an 810nm wavelength is used for treating pain while a cluster probe can be used to treat inflammation of soft tissues .the greatest effect of the above methods acts well when the laser probe is held in the direct contact of skin [6].

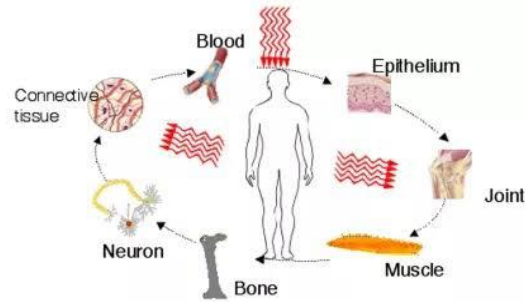


Figure7. General muscle diagram

11. CONCLUSION

In conclusion the use of light therapy for the treatment of acne was uncommon and technologically was neglected. Nowadays many skin diseases like psoriasis is also treated by inducing light which is done by emitting UV radiations. Phototherapy took the combination of excellent clinical tools and outstanding clinical skills to achieve the desired clinical results .this treatment helped people a lot. The article also contains the lasers usage of muscular relief and wound healing without any side effects. One of the important aspect of phototherapy is that it eliminates the Bilirubin in blood and this helps in treating the jaundice disease in infants. Phototherapy plays the major role in all living organism it has many functions depending upon the wavelength range some of the application of photo inducing therapy have been discussed in this article.

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