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Application of UV Spectrum in Medical and other Diversified Fields

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Abstract— UV has been emerged as a systematic tool for medical science as well as other diversified fields over last two decade. UV is successfully utilized in industrial and commercial fields as on date. We have studied its utility in context of treatment of skin disorders. The medical importance of the UVB is proven from various research and test reports carried out in labs, clinics spread across the globe. The spectrum covering wavelengths from 240 nm to 360 nm are categorically divided into three segments UV A (320nm-360nm), UV B (290nm-320nm) and UV C (240nm-290nm). We have concentrated on the medical applications of UVB having 311nm wavelengeth. The results obtained are quite satisfactory.

Keywords*-UVB,Phototherapy,vitiligo treatment*

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Introduction

The Ultra violet rays are found to be important in many fields.To mention a fewapplications **t**he Longwave UV – (365nm) is used fields like Bacterial Identification, Specimen Staining, Gel Electrophoresis, Chlorination, Fluorochemistry, Pesticide Analysis, Fluorescence Photography, Titration Processes, TLC, Nucleic Acid Visualization, Genetic Experiments etc. The Virology Sanitation covers Aflatoxin Detection, Rodent Contamination and Lice Detection, Detection of Food Contamination, Milkstone Inspection, E-Coli Water Testing, Culture Fluorescence etc. In Medical field also it is used for Medical Diagnosis, Dermatology, Cosmetology etc. The Educational field uses it for Fluorescence Demonstration and Analysis.

In Industrial applications Non-Destructive Testing, UV Curing, Magnetic Particle Inspection, Inspection of Conformal Coatings are the areas where UV is useful. In Criminology it is applicable for Detection of Altered Documents, Counterfeit Currency Detection, Signature Verification, Forensic Applications, Coding/Marking, Arson Investigation and Lab Testing. In the field of Electronics Clean Room Inspection, Epoxy Coat, Quality Control, Inspection are the areas of utility. Miscellaneous applications like Examination of Fine Art Archaeology, Entomology, Photoresist Exposure, Philately, Re-Admission Control, Mineralogy Automotive Leak Detection and Windshield Repair are also there. Midrange UV (302nm) which has Research Gel Electrophoresis , Gel Viewing , Optical Lab Measurements Industrial UV Curing, Gradient Sampling , Solar Experimentation.

We have mainly followed the medical utility of UVB in dermatology. Many features including the penetration level of the different wavelengths, interaction with the skin, effect of variation in exposure time and energy dose level were studied. The use of Excimer laser was also examined[4][6]. We have tried to obtain photographs of patients for detail analysis of curing rate and percentage of curing.

Method

Medical Phototherapy is the main area of interest where we have carried out few case studies at clinical labs. The unit from Daavlincompany was used as a source of phototherapy. The study carried out on case to case basis. More than 50% patients achieved satisfactory results from phototherapy. The disease we have worked upon is vitiligo. It is found that the rate of repigmentation was faster for new or recently dipigmented patches. The patches having history of minimum six months took longer time to clear. The patients maintaining regularity in the treatment could get noticeable results. The patients who were careful enough to start early treatment as the very first patch appeared on the skin got quick response and cured completely.

Limitation

The phototherapy has few limitations to note. The treatment schedule is thrice a week and for at least six months in succession it is to be followed. In this method the treatment continues for long session with step by step increment in doses. Conventional phototherapy have the main disadvantage of exposure of unaffected areas to UV light. The devices used are not handy so patient has to visit the clinic for long period. Certain body parts cannot be treated due to risk involved. Especially children patients do not cope up with such type of treatment.

Conclusion

The UV spectrum has many fold applications in diversified fields. The use of small portion of light spectrum has been proved to be of great importance for curing a number of

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diseases related to skin. UVB phototherapy is playing vital role in the treatment of dermatological diseases like psoriasis and vitiligo. In coming years new research in this field with analytical and statistical data of patients may come out with remarkable success.

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Diagrammatic representation of the variation in penetration of UV,visible and near IR radiation into tissue (figure not scaled)

Reference : IADVL Text Book Vol. I.