

# A review article on Anti-Fungal Nail Lacquer Using Treatment of Onychomycosis

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**ABSTRACT-** The purpose of written review paper on anti-fungal nail lacquer which is used in treatment of Onychomycosis skin fungal disorder was focus on the disease causes and treatment by nail lacquer, onychomycosis causes by the pathogens include dermatophytes, candida, and non-dermatophytes. Improvement clinical efficacy and also proper the patients compliance. Nail Lacquer preparation by simple mixing non-volatile, gloss, smoothness to flow, drug diffusion studies drug content estimation, Nail lacquer is used on fingernails, toenails of the human beings. Which is protect the nail but, nail plate but most of significant in maximize the beauty, gloss, impart colour. Nail lacquer is mostly applicable for those drug which have poor bioavailability in oral formulation this techniques is used in maximize the topical bioavailability of drug across the nail.

**Key word-** Fungal infections, Nail Lacquer, Onychomycosis

**INTRODUCTION:** All over the last time of period the treatment of illness has been carried out by administration drugs to human body by many routes namely oral, topical, inhalation etc. human nails do not have only protective and decorative act, but can also be regarded as an substitute tract for drug delivery, particularly the nail disease such as psoriasis. These nails disease are to great degree dispersed in the population, particularly among older and immune composition patients. The successful treatment nail disease the used active drug must permeate by the dense keratinized nail plate and arrive deeper layers, nail bed and the nail matrix. The nail disease is caused by the fungal infection, these disease is cured by achieving desired curative concentration.

**FUNGAL INFECTION-** The fungus is crude organism and the fungi can live all over in the air, in the soil, on the plant and in the Fungal infections the classed by capable of causing harm fungi are very common determine, and it not so serious if they are diagnosed fast and right treated. All the same while fungal infections are solicitude, one of treated again injection can easy fall out, as fungi can be create problem to skill. The fungal are frequently present in the totality of surrounding conditions.

**OCCURRENCES-** The fungal spores are available in the totality of surrounding conditions and can inhale the spores. They can lead on the people the fungal infection are begins in the respiration or in the skin.

**EXAMPLE OF FUNGAL INFECTIONS-** Athlete's foot, ringworm, yeast infection, jack itch, fungal infection of the slain, psoriasis.

## PRONE OF THE FUNGAL INFECTION-

- Person with low immune system are that are children older person are suffering from AIDS, HIV infection, cancer and diabetes.
- The people are relation with those people suffering from the fungal infection.
- People have highly dermis bend.
- The people are often generally place or site with moisture and that is rooms, present and since fungi require moisture to develop and minimize.
- The person who has more sweat and use sweating clothes and shoes can high chance the fungi develop on the dermis.

## CAUSES OF FUNGAL INFECTION-

The yeast is general fungus that is candida the fungal infection fall out in fungal spores come in dermis or fungus are inhaled.

## TREATMENT OF FUNGAL INFECTION-

The fungal infection, doctor will treated having base on several kind of infection that is fungal, it may prescribed the topical antifungal medication, most fungal infection can be cure with concluded the counter or prescription creams.

## SOME MEDICINES NAME WHICH IS APPLY IN TREATMENT OF FUNGAL INFECTIONS-

Topical antifungal is fluconazole creams, antifungal nail lacquer. Oral medication Terbinafine 250 mg tablets.

### NAIL DISEASE-

The nail plate may seem not in normal as a conclusion of congenital defect, disease of dermis with attachment of the nail bed, systematic disease, minimize of blood supply, local trauma, infection of the nail folds, Infectious nail plate.

**A- GREEN NAIL SYNDROME**-Pseudomonas is kind of fungus which is cause the infection

### B-PARONYCHIA-

**1-ACUTE PARONYCHIA**- Bacterial infections e.g. group A streptococci .that is cause the swelling violent pain.

**2-CHRONIC PARONYCHIA**- Mainly fall out in patients whose hands are invariably in water with recurrent lower trauma prejudicial the cuticle so that throne can farther harm the nail fold. Generally get infected particularly with pseudomonas develops a green or black discoloration.

**C-NAIL PSORIASIS**- Scurfy dermis the nail plate gets cavities dry and frequent tumble and also appears red, orange and brown with red dots.

**D-YELLOW NAIL SYNDROME**- A not widely known position qualify via yellow nail with lack of cuticle, develop slowly and it minimize or separated.

**E-ONYCHOMYCOSIS**- It is chronicle for third of integumentary fungal infection and one half of all nail disease.

**PARAKERATOSIS**- Presenting hyperkeratosis.

### ONYCHOMYCOSIS-

People with infection are frequent feel shame about nail not in figure, because it can one time limits the quality of moving freely, it may indirectly minimize peripheral circulation because of that decline position that are several stasis and foot ulcers Fungal infections of the nails can also dispersed to another site of the body to another human.



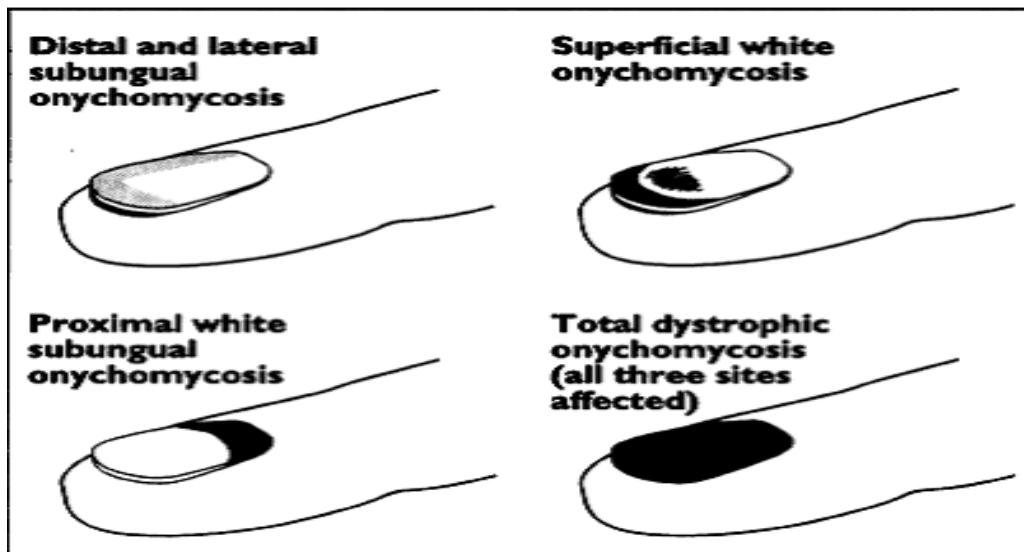
## ONYCHOMYCOSIS

### CLASSIFICATION OF ONYCHOMYCOSIS-

**A- DISTAL SBUNGAL ONYCHOMYCOSIS**- The more general form may growth in the toenails, fingernails or both, infection is normally caused by trichophyton rubrum which attach in nail bed and the bottom of the nail plate, starting at migrating proximally done inherent nail matrix.

**B- WHITE SUPERFICIAL ONYCHOMYCOSIS**- Once 10% of cases which is caused by several fungus that direct attach the superficial layers of the nail plate and develop well represented opaque white island on the plate the nail is rough, soft and friable. This several of disorder can be treated with topical antifungal drug alone.

- C- PROXIMAL SUB UNGALONYCHOMYCOSIS-** It is fall out while infecting organism commonly attach the nail through proximal nail fold, penetrate the newer develop nail plate and then migrate distally.
- D- CANDIDA ONYCHOMYCOSIS-** It can category into three part-
- 1-Infection starting as infection structure encompassing the nail known felon.
  - 2-Chronic for lower than 1% of disorder this position is seen in immune via media patients and attach direct of the nail plates.
  - 3-While nail plate has removed from nail bed.



### CLASSIFICATION OF THE ONYCHOMYCOSIS

#### CLINICAL FEATURES-

The nail plate can having become thick yellow or cloudy looks. The nail can get hard and friable or can removed from the nail bed. There is normally no pain or another bodily sign and symptoms, unless the disorder is service fungal free skin that one time from as conclusion of fungal infection in other site of the human body.

This could take the form of imprudently incurring risk or itch in an site of the human body that is not infected with fungus. People with fungus infection may experience problems in appearance of the nails.

#### DIAGNOSIS OF ONYCHOMYCOSIS-

Conventional method for identification fungal organism in the nail plate of the patients include direct microscopy, fungal culture and histopathology. Surgical pathology testing using PAS stain is the current gold standard for diagnosis, newer method for diagnosis include polymerase chain reaction, optical coherence tomography, confocal laser scan microscopy, matrix-assisted laser desorption/ionization time of high mass spectroscopy, contrast hard x-ray microscopy. Conformational of observation and availability and cost must be considered before these newer methods for diagnosing can be incorporated in clinical practice.

#### TREATMENT OF ONYCHOMYCOSIS-

Several modalities can be used for the treatment of disease topical therapy, systemic therapy, combination therapy, nail removal and nail lacquer.

#### NAIL LACQUER-

Nail polish or nail varnish is used for people fingernail or toenail to decorate and/or protection the nail plate. Conventional nail lacquer have been applied as cosmetics since a large duration for beautification and protection of nails. Topical nail preparation like lacquer, enamel and varnish are integral part of today's beautification curative. It is help for defence to the nail plate, but most significantly it maximize their glowing, imparting colour.

Formulation of active objects, large tissue concentration for capacity for the treatment of nail fungal disease.

The medicated drug are colourless and non-glossy to be applied for male patients, and more significant the drug are produce from the film so it can penetrate in to the nail the drug consisting polymer film may be considered as a matrix type controlled release the drug are closely spread with polymer and predicted the spread drug in polymer film before it is produce.

### **MECHANISM OF NAIL LACQUER-**

Dispersed drug will soluble in the polymer film before it is produce. Drug is produce from the film will be governed by Fick's law of diffusion that is across plane surface of unit area will be given by:

$$J=D \frac{dc}{dx}$$

Where

D= diffusion coefficient of the drug in the film,  $\frac{dc}{dx}$ = concentration gradient of the drug across the diffusion path of dx.

The thickness of the diffusion path grow with time, as the film surface adjacent to the nail surface becomes drug increase in concentration in lacquer result increase drug uptake.

Drug consisting nail lacquer are new formulation. Marketed formulation begin marketed in 1992 is clean colourless liquid and consists the antifungal amorolfine 5% eudragit RL 100 glycerol triacetate, butyl acetate, ethyl acetate and ethanol. The nail lacquer is used 1-2 time weekly to infected nail plates for up to 6 months and 9-12 months for toenails, approved by FDA in 1999. A clean colourless liquid, it consist the antifungal agent it is used up to 48 weeks. The film is separated every 7 days with alcohol before re use of nail lacquer.

### **ADVANTAGES OF NAIL LACQUER-**

- It cannot be easily separated through rubbing or washing.
- In mixing, the effectual is large lasting, once using of lacquer give defence for once week.
- Produce and rate of diffusion can be made optimal by choosing the lacquer preparation (solvents, polymer and plasticizer).
- Formulation is easily as equivalence to oral dosage form.
- Lower or no systemic adverse effect.
- Regarding nail pharmacokinetics a lots of less portion of oral dose arrives nails. Localized therapy there by aid minimizing dose.

### **DISADVANTAGES OF NAIL LACQUER-**

- Rashes associated to side effect that is erythema of proximal ail fold were presentation more often.
- Another side effect which were thought to be normally related consist nail disorder that are shape change, irritation, ingrown toe nail and discoloration.



### **MARKETED ANTI FUNGAL NAIL LACQUER**

### **CONSTITUENT OF NAIL LACQUER-**

The general nail lacquer contain of solvents, film forming polymer, resins which enable the film to in accordance with to nail plate and made known shinning to the film, colouring agent and suspending agents.

- A- FILM FORMERS-** A numerous of film forming material have been advice for nail enamels, These consists nitrocellulose, cellulose acetate, ethyl cellulose and various polymers applied as film former.
- B- RESINS-** Resins pass on adhesion and make proper gloss. Generally resins are chaired to enhance moisture opposite. They are dissolve in more bulky and solvents.
- C- PLASTICIZERS-** Plasticizers pass on flexibility and adhesion to the surface there are various kind of plasticizers, solvent and non-solvent plasticizers. The number of plasticizers which can be applied in nail lacquer varies mostly and may vary form 25% to 50% of film former.
- D- SOLVENTS-** Although evaporation character are of firstly significance in nail lacquer, but fast rate of evaporation cause a pot flow of enamel conclusion in uniform and marked with use. Solvent are commonly category according to their boiling points.
- E- PIGMENTS-** Pigments applied as nail should have the same properties as applied in other cosmetic. Generally applied pigments are titanium dioxide, yellow iron oxide, red iron oxide, etc.
- F- SUSPENDING AGENTS-** Not soluble pigments and inclination to settle, thence to avoid this suspending agents such as colloidal clays like bentonite can be used. The preparation construction for nail use and few methods applied to maximize the topical bioavailability of the drug across the nail, least in drug delivery across the nail.

### **ABSORPTION THROUGH NAIL-**

Nail plate is around 0.25-0.6 mm, which is around 100 fold thicker than the stratum corneum. In the opposition to the stratum, the nail plate nature like a concentration. Hydrogel instead than membrane. Hydration can effectual the effective pore size of hydrogel and thence the trans ungal transport, hydrated person nail plates nature like a hydrogel of more ionic strength to the polar & semi polar alcohols. Furthermore the nail is firstly make better with largely disulphide-linked keratin. The nail make better for the penetration of short hydrophilic molecules. Most pharmaceutical agents are large and highly lipophilic and therefore unable to diffuse across the nail at curative concentration. Lipophilic vehicles and particularly nail lacquer are most place for topical used on the nail than aqueous system because of their good adhesion. Penetration by the nail plate follows first order kinetics after a lag time of 400 hours. The duration of penetration primarily is membrane-controlled and later gets a matrix controlled method because of the membranes largely permeability.

### **TO ACHIEVE SATISFACTORY FILM IT SHOULD HAVE THE FOLLOWING CHARACTERSTCS-**

- It should have better wetting and flow properties so that film former is even.
- It should have uniform colour.
- It should have better gloss.
- It should have good adhesive properties.
- It should have amount flexibility so that it does not crack or get brittle.
- It should have amount hard surface which is opposite to impact and scratch.
- It should have reason drying time 1-2 minutes.
- It should be capable to proper the above mentioned for reasonable time about one week.

### **REFERENCES-**

- Gupchup GV, Zatz JL. Structural characteristics and permeability properties of the human nail: A review j cosmet Sci 1995;50:363-385.
- Rajendra VB, Baro A, Kumari A Dharmendra DL Lahoti SR Shelke SD. Transungal drug delivery : An overview J appl Pharm Sci 2012;2(1):203-09.
- Patel RP, Naik SA, Suthar AM Drug delivery across human nail Int J Curr Pharm Res Vol Issue 1 2009: 01;01-7.
- Suryavanshi KA Basru Kateseshmukh RG. Review on nail transungal drug delivery system. Am Pharm tech Res 2012 (5);222-04.
- Sabreen J Divyakumar B Kiran B. Preungal drug delivery systems of terbinafine hydrochloride nail lacquer. Asian Pharm 2008;02;53-06.
- Shriwarikar AA, Thomas TA Lobo R, Prabhu KS Treatment of onychomycosis: An update.Ind J Pharm Sci 2008 Nov-Dec;07 ; 710-14.
- Lalit SK Panvar SA Darwhaker G Jain DK. Formulation and Evaluation of fluconazole Amphiphilogel Der Pharmacia Letter 2011;3(5); 125-31.

- Kobayashi Y, Komastu T, Sumi M, Numajiri S, Miyamoto M, Kobayashi D, Sugibayashi K, Morimoto Y. In vitro permeation of several drugs through the human nail plate. Relationship between physicochemical properties and nail permeability of drug. *enr J pharm Sci* 2004;21:471-477.
- Alam G, Singh A, Vishwakarma DK, Patel R, Srivastava SP. Transungual drug transport advancement and challenge. *J Pharm Res* 2012;5(5) 2574-79.
- Walters K, A Flynn G, L Marvel JR. Penetration of the human nail plate: the effects of vehicle pH on the permeation of miconazole. *J pharmaaco* 1985;37:498-499.
- Pravin DC, Shilpa PC, Pramod KK, Bothrija C. Drug delivery through nail. 2006 cited 2010 now 29. Available from URL.
- Boni E, Elewski, Onychomycosis Pathogenesis. Diagnosis and Management. *clin microbial rev* july 1998 vol 3 r415-429.
- Phillip R And Bassler M. Treating onychomycosis. University of Michigan medical school Ann Arbor Michigan Am Fam Physician 2001 feb 15;63 (4); 663-673.
- Cohen PR Scher RK. Topical and surgical treatment of onychomycosis. *J am acad dremol* 1994;31 S74-S77.
- Gupta AK, Lynde CW, Jain HC, Sibbad RG, Elwski BE, Daniel CR, Wattee GL, Summerbell RC. A higher prevalence of onychomycosis Compared with non psoriatic ;A Multicenter study. *The British journal pf dermatology* 1997 135;786-789.
- Pati NB, Bilap DK, Sudip D, Subhas S, Nail drug delivery system; A review, *journal of advance Pharmacy Education and research* 2012 2 (3) 101-109.
- Tandel A, Agrwal S, Wankhade S, Transungual permeation of the voriconazole nail lacquer against *tryphyton rubrum*. *journal of drug delivery and therapeutics* 2012, 2 (1) 162-8.
- Marker A N, Pattan SR, Dighe NS, NAirmal SA, Gore ST, Phad MB, Preungal drug delivery system of Enalapril Maleate Nail Lacquer. *Inventi impact ndds* 2012 articler id inventi pndds 366/12 102-5.
- Indian pharmacopeia Government of India, Ministry of health and family welfare vol 2 Delhi Controller of publication 2007;771.