

# Epidemiology of head lice with reference to diagnosis and treatment

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**Abstract-**Head lice infestation is the infection caused by the lice in any part of the body i.e. on the head, skin etc. head lice is the insect which is very small in size of about 1-3 mm in length. There is significant history of the head lice from different countries of the world including the Pakistan. It has been studied due to the infestations caused by it and by knowing it we can found the proper treatment for it. The prevalence rate is more in the females as compare to the males. Different epidemiological and the histopathology characters of the head lice have also mentioned. The clinical manifestations are mentioned in our research article. The development includes the nits, nymph and the adult stages. The head lice infestation includes the loss of the energy, the increase in the nervousness, skin inflammation etc. We conducted the survey in the selected regions of the Narowal and mostly we collected data from the schools (Government and private).Pictorial key has been used for identification of head lice. There are different behavior shown by the head lice including the feeding, transmission and the position on the host etc. it has five mitochondrial clades i.e A, B, C, D and E. the diagnosis methods includes the use of the chemicals, instruments such as comb and the other organisms such as mite. Treatments include the use of the substances (methionine, Lindane, Carbaryl, Crotamiton etc), chemicals, head lice resistant products, instruments such as we comb, oral products and the head lice repellants. The chemicals and the substances are used in different amount. The oral products are used indifferent doses. Some of these chemicals and the substances requires the use of the antibiotics along with. **(Read it again with reference to tense case)**

**Key words-**Human head lice, *Pediculus humanus capitis*, lice species in Narowal

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## INTRODUCTION

### *What are lice?*

Lice are the wingless and obligate ecto-parasites. These are found in hair scalp commonly in the children of 5-13 years of age with their highest peaks. Lice does not act as vector of causing disease in human, so it has no significant health risk. (Burgass et al. 2004)

#### *A. Common Characteristics of head lice*

The head lice are a host specific arthropod and having a length of 1-3mm. It is from grayish to whitish in color. Lice has the insect characters like thin mouth parts that suck out the blood, a head, short antennae and three pairs of legs that are used for holding. Head lice's speed to move is upto 23cm/min and it is unable to jump or fly. The eggs of the lice are called nits and are of 0.8mm in length and are laid within 1-2mm on the scalp surface. One female lay eggs about 150 in a month. When lice are young, it hatches within a week and goes to three nymphal stages. (Larval stages have no sexual characters). First and second larvae are not able to move. When it bites, it causes inflammatory reactions. (Suleman M.et all 1998) Almost more than 550 species of lice are classified. Among in these, three species are more common and found in human heads. These are *Pediculus human's capitis* (head), *Pediculus human's humanus* (body). (Sabila. A.,et all 2018).

#### *B. History*

Developed countries especially Latin, America, Asia and and middle East have published their own and original research on the head lice. (Spear.R.,et all 2008)

Different national and international databases were investigated to provide articles published by different countries from January 1, 2000 to January 20,2015. (Moosazadeh.M.,et all 2015)

The research was made in Amman in school childs and the rate of head lice was between 5-78% in these childs. (Albashtawy.M., et al 2012)

Lices have been found in most part of the world including the mummies that is the body of the human being or any other animal that is preserved in the resin, in new world and in all other world. This shows that different species of lices share a long record of coevolution. Some lices can transmit the bacteria in humans, for example, *Pediculosis corporis*. The oldest human lice was found on a hair in North Eastern Brazil in 1800B.C. 9000 years old lice was obtained from a sample of hair of an individual who ws living in Nahal Hemar cave in Israel. Head lice was found in south Eastern USA also including the Aleutian Island, Peru, Greenland and Mexico. One more discovery of lice is reported in Maitas Chiribaya mummy from Arica. (Amina.B.,et all 2014)

#### *C. Prevalence*

The survey as made in Peshawar in December 1986 with rate of 49% in girls and boys with 40%. In the southern Israel, survey described that 55% children are infected with head lice. In korea, the overall infestation rate was 58.9% in rural areas and 14.4% in urban areas in more than 10000 children. Their prevalence rate was 24.4%. In the south of Iran, the prevelance rate is 27% within 6-14 years of age. (Vahab. A., et al. 2012)

The prevalence of the head lice in NWFP of Pakistan is estimated about 36.7% in females and 27.7% in

males according to 1986 survey. The prevalence rate is different from place to place. Like 2.4% in England, 10.7-12.9% in Malaysia, 17.1% in Kenya, 12% in Saudi Arabia. In Egypt, primary schools, girls have 25.8%. In Peshawar, 45%, 26% in D.I Khan and 45% in Karachi. (Sabila.A., et al. 2018)

#### **D. Epidemiologic characteristics**

The prevalence of head lice is very high. Endemic occur regularly even all efforts of command (Marshall, M. N. et al. 2001). No age or economic grade may fight well and is immune to *P. humanus capitis*, although congested life conditions likely are affiliated with a higher prevalence of plague. *P. humanus capitis* is the most ordinary parasitic and cause infection in children. Infestations are inferior in blacks, due to physical trait of their hair rod, which is more egg-shaped and is therefore more arduous to hold. (Janniger, C. K. et al. 2008)

Head lice nits are not affected by hair length or abundance of shampooing. (Frankowski, B. and Weiner, L. B 2002) Girls are around twice infected by head lice as compare to boys (Burgess, I. 2002) Head-to-head association is the most important manner of communication and cause the transfer of head lice from person to person. Pediculosis capitis can be transferred by overrun clothing, hats, hairbrushes, combs, towels, bedding, and cushioning etc. (Janniger, C. K. et al. 2008).

#### **E. Histopathologic characteristics**

The regular wound shows a deep solid piece, hemorrhage on intradermal side with a perivascular infiltrate of cells including lymphocytes, histiocytes, and eosinophils within the bark. (Fauston, N. et al. 2005)

#### **F. Clinical manifestations**

Head lice plague is characterized by nits join to hairs nearly 0.7 cm from the scalp or dryness. Pruritus is the capital symptom, even though patients with lice can be asymptomatic (Miller, J. et al. 1991). Symptoms of infection cause by head lice including bite reactions, excoriations, secondary impetiginization, pyoderma, cervical lymphadenopathy, conjunctivitis, fever, and uneasiness. New bites may cause revival of already recover bites (Janniger, C. K. et al. 2008).

Pyoderma may be associated with baldness. A morbilliform hyper sensitivity careless can imitator a viral exanthema. In somecases, dermatitis of changeable severity can be seen, distinguished by exudation and crusting, especially in the occipital region. Innumerable lice and nits can be found under the mix up hair mass. At the time of the first lice disease, pruritus may not be seen for 1 to 2 months because it takes time to prosper acuteness. (Miller, J. et al. 1991)

## **II. ADULT MORPHOLOGY AND LIFE SPAN**

Head lice come in the suborder Anoplura. Lices are small, 2.4-3mm long, flattened from dorsal and ventral side and are totally wingless. (Buxton, Patricia A., 1947) The segments in the thoracic region are small but are distinct from the abdominal and the head region. The abdomen is composed of seven segments. These are mostly grey in color but it may vary according to the environment in which they present. The body becomes reddish when head lice effect the body. (Buxton, Patricia A., 1947)

### **A. Head**

Head consists of a pair of antennae (each antennae have 5 segments), a pair of eye and a mouth. The eyes are present in all spiracles in the Pediculidae but are absent in other families of the order Anoplura. The mouth is such that used for piercing skin and sucking the blood. (Buxton, Patric A., 1947) These mouthparts are only used during feeding. (Williams AK. et al., 2001)

### **B. Thorax**

Three segments of thorax and every segment has a pair of leg on it. legs are short and end with a single claw and thumb opposing claw. Between these regions the lice grasp to its host with hairs. (Buxton, Patric A., 1947) these two regions help them in walking and even jumping on the flat surfaces. Lice move from hair to hair and can move easily to another host. (Munder, JW., 1983)

### **C. Abdomen**

It consists of seven segments. First three have a pair of spiracles for the transfer of gases. The last segment consists of anus and the genitalia. (Buxton and Patric A. 1947)

### **D. Sex differences**

There are sex differences which differentiate them into male and female easily. In male the front two legs are larger than the other four legs and this larger pair is used for the holding of the female during the copulation. Males are smaller than females having the pointed abdomen and well developed genital organs. Females have two gonopods in the W shape at the last segment of the abdomen. (Munder, JW., 1983)

### **E. Reproduction and life span (adult)**

The parthenogenesis does not occur in the head lice found in the human head. Pairing occurs in the first ten hours in the adult life. After twenty four hours adult lice copulate and mating occurs in any part of the day or night. (Buxton, Patric A., 1947) Mating continues for one hour. Young males can mate with old females. the study and the experiment shows that when a single female will mate with six or more than six males will die in a few days and will lay very few eggs. Same was the case when the death of the virgin female was observed after admitting a male to her confinement. That female lay only one egg after mating and her body were tinged with the red due to rupture of the alimentary canal due to sexual intercourse. (Bacot A., 1017) A head louse has the thirty days lifespan from the nit to the adult. (Mumcuoglu KY., Miller J. et al., 1990)

### **F. Eggs or nits**

Head lice are oviparous means producing the eggs that develop outside the body. Female laid only three or four eggs. The egg laying behavior depends upon the temperature varying from place to place or location to location. In cold environment the eggs are laid within three to five mm of the scalp surface while in warm climate eggs may be laid six inches or more down the hair shaft. (Meinking. and Terri Lynn., 1999). The adult female releases the glue from her reproductive organ for the attachment. This glue hardens rapidly into nit sheath covering the hair shaft. The eggs are oval in shape and are about 0.8mm in length. These are transparent, bright and are coffee to brown colored. (Williams LK., Reichert A., et al. 2001). Head lice eggs hatch within six to nine days after oviposition. After hatching the nymph leaves the eggshell. The egg shells are empty and remain in

that place until removed by physical abrasion. (Burgess. IF., 1995)

### G. Nymphs

Head lice are hemimetabolous. The nymphs is molted three times before reaching the adult. Thus, we can say that it has four developmental stages. Three nymphal instars and the adult. The only distinct difference between the instar and the adult is the length of the abdomen which becomes bigger after every molt. The behavior of the nymph is similar to the adult. Nymph takes food only from the human blood. The completion of the nymph development depends upon the feeding conditions. It requires the eight to nine days for reaching to the human host. The conditions where feeding requirements are limited require twelve to the twenty four days. The death rate is 38% especially within the first two days. In the third instars the mortality rate is highest at its peak. Failure of the complete hatch of the nymph is dangerous to it. Death during molting may also occurs. During feeding the nymph gut may rupture. This will results in death within two or three days. However the experimental conditions are unclear. (Buxton and Patrick A., 1947)

## III. INFESTATION

Head lice pervasion motivated by *Pediculus humanus capitis* is a general issue which pervades kids at 5 and 13 years old. (Hodjati et al.,2008). Ectoparasitoses are commonly viewed as enraging issue, this issue do not require clinical intrigue however can cause urgent discouragement. Truth be told that this ectoparasite isn't known to be vector of diseases, *pediculosis* causes touchiness, trouble resting, optional bacterial contamination, scalp pruritus abrasion, ophthalmitis and mental pain (Malcolm, C.E., J.N et al., 2007)

Ectoparasitic invasions can be fitful, pandemic and autochthonous (Takano-Lee M et al., 2004). Pervasions of lice that live on skin cause nervousness, this invasion do not require clinical intrigue however can cause pivotal wretchedness. Head lice may cause unsavory inclination and may exasperate the tutoring work (Chaudhry S et al., 2012). Invasion of lice is known as *Pediculosis* (Merck and Co, 2008, Maunder JW, 1983). . In every couple of hours the head lice sucking little measure of blood from the scalp of the host by embeddings little measure of spit into host. Because of over the top invasion and regular sustaining of the host blood may prompt iron insufficiency and ensuing pallor, myasis, plica, polonica and unfavorably susceptible responses, for example, nasal impediment, rhinorrhea and daily whistles.(Cazorla et al.,2007)

### A. Factors affecting infestation

Infestation rate depends upon the quantity of youngsters per family, the sharing of beds and wardrobes, hair washing propensities, neighborhood traditions and social contacts, medicinal services in a specific zone (for example school), and financial status were observed to be critical factors in head mite invasion. Young ladies are two to multiple times more every now and again invaded than young men. Youngsters somewhere in the range of 4 and 14 years old are the most habitually pervaded group (Mumcuoglu KY, Miller J, Gofin R, et al.,1990)

### B. Detection of head louse

The exhibiting side effect is typically a bothersome scalp. The first occasion when somebody is invaded, the tingle may take a little while to create; with ensuing pervasions the beginning of tingle is sooner. It isn't exceptional for a tyke who has not had lice

before to give occipital lymphadenopathy without tingle, optional impetigo at the back of the neck, or for sure to be asymptomatic. Scratching can cause abrasions, which can turn out to be optionally contaminated. On the off chance that head lice are suspected, the key highlights to search for are:

- Eggs cases near the scalp, which contain live eggs. These might be hard to see with the unaided eye, and an amplifying glass or dermatoscope might be valuable.
- Egg cases further far from the scalp might be simpler to spot. They are straightforward and appear all the more effectively on dull hair. On the off chance that the individual has been dealt with as of late, at that point these egg cases may not demonstrate a functioning invasion.
- Live lice on the scalp. In the event that any are seen, this is a definite marker of current invasion. Brushing with a location brush may get a couple of live lice. Note that the identification brush has more extensive divided teeth than the looks over intended for nit expulsion, and is increasingly powerful whenever utilized on wet hair.
- Lice droppings, which resemble modest dull bits, might be found on pads or dress. (Whybrew, C. 2017)

#### IV. BEHAVIOR

##### A. Feeding

All the stages other than eggs are dependent on blood and prick on the outer surface of body of the head four to five times routinely in order to alive and grow. Lices insert their froth which including un clotting agent that doesn't clot the blood and sip the blood from the host. The meditate blood is defecate as rube scent frass.

##### B. Position on host

Despite every portion of scalp can be grouped, lices mostly stick their eggs behind the surface of ears and nape of neck, and these places accommodate it for their growth. Light force back the head lices thus they shift and approaching to the darkened space.

##### C. Transmission

Lices have no power of flight or no such a legs that are helpful in jumping, so they crawl by using claw like legs and thus they are transfer from hair to hair and assail on a new host. By contagious association between individuals, executing gregarious acquaintances among children and parent-child interactions are more likely the paths of affliction than shared combs, hats, brushes, towels, clothing, beds, or closets. Head-to-head contact is definitely the most common way of louse transmission.

Lice are frequently scattering illness for the sake of stickiness to their hosts. From 0-14 age, head lice infestation was more in girls while very rare in boys, and infestation rate fall at age 15-18 years. Head Lice might be infest to all ages of the individuals but in children is excessive through adjacent touch between children at the time of playing, giving own items such as combs, brushes, scarves, caps, head phones or sports helmets..

Many studies survey have demonstrated the high vulnerability of spreading of lice infestation among 8-14 age group which is feasible through close head contact between children as they become more friendly . Crowding is one the basic reason of head louse spreading. The spreading of head louse is more common in poor countries, and more populated area due to poor hygiene conditions, lack of health

facilities and non awareness of school health educator.

**V. DISTRIBUTION**

Head louse can live on the head, on soft furnishings such as pillow cases, on hairbrushes, or on coat hoods for up to almost 48 hours. In US, around 5-14 million people are getting cured against head lice are treated, majorly children among the age of 5-13 years old, annually. About two thirds of children will definitely suffer from the head lice infestation before leaving primary school. (Burgess, IF, 2004). This case can also be seen with major contribution in Australia, Denmark, France, Ireland, Israel, and Sweden. (Mumcuoglu K, et al, 2007).

**VI. ARCHAEOGENETICS**

It is the study of ancient DNA using various molecular genetics methods and DNA resources. When it was analyzed in lice of the Peruvian mummies, this indicated that diseases like typhus might transferred from the New World to the Old World, instead of the other way around. (Anderson and Andrea, 2008).

**VII. GENOME**

The full genetic setup of the body louse sequencing was put forth in the mid 2000s. (Pittendrigh BR, et al. 2006) and then it was published in 2010. (Kirkness EF, et al. 2010). An analysis of the body and head louse transcriptomics showed that these two organisms are extremely genetically identical. (Olds BP, et al. 2012).

**A. Mitochondrial clades**

The human head louse are categorized into three mainly broader divergent mitochondrial clades as: (Morand, Serge, et al. 2015).

- Clade A
- Clade B
- Clade C

But later two subclades were identified: (Liao, et al. 2017).

- D (a sub clade of A)
- E (a sub clade of C)

**Table: 1**

Clade	A	B	C	D	E
<b>Types of lice</b>	Head and body	Head only	Head only	Head and body	Head only
	World wide	World wide			
<b>Occurrence</b>	Ancient Roman Judea	Ancient Roman Judea	Nepal, Thailand	Central Africa, Ethiopia	West Africa
		4,000-year-old Chilean mummy			



## VIII. DIAGNOSIS

The best method for diagnosing head louse is the identification of a live louse, nymph, or a viable nit on the head. Because head louse avoid light and crawl quickly, visual inspection without combing is difficult. Nits by themselves are not diagnostic by active infestation. However, if the nits are found within 0.7 cm of the scalp, active infestation is likely occur. (CJ, Elston DM et al. 2004)

Using louse combs increases the chances of finding live lice and is a helpful screening tool. (Mumcuoglu KY et al. 2001). The diagnosis of lice infestation using a louse comb is much more efficient than a direct visual examination. The tiny nits are easier to observe, especially at these places i.e. nape of the neck or behind the ears. (Weiner LB et al. 2006). Recognition can be facilitated by a magnifying glass. Wood's lamp examination reveals yellow-green fluorescence of the lice and their nits. (Guenther L et al. 2006). Dermoscopy is also a possible aid in the diagnosis and follow-up of *Pediculosis capitis*. There are new generations of handheld dermoscopes that do not require direct contact, preventing the possible risk of transfer. (Di Stefani A et al. 2006).

Determination of mite invasion utilizing a mite brush is multiple times progressively productive than directly visual examination and twice as quick. The direct visual examination system belittles dynamic invasion and recognizes past, non dynamic pervasions. Direct visual examination is anything but a dependable strategy for the conclusion of living lice on hair. Brushing with a mite brush was multiple times more viable than and twice as quick for the determination of mite pervasion as immediate visual

examination in this study. We prescribe that a mite brush be utilized to screen youngsters for lice pervasion and for affirmation that treatment with a pediculicide is compelling. Since mite looks over can likewise be utilized for aversion and treatment of mite invasions and for the evacuation of nits, they ought to be an essential piece of any mite control methodology. (Kosta Y et al. 2001)

### A. *No. of diagnosis:*

**Table 1:**

1. Internal root sheath leftovers (hair throws)
2. Dark piedra
3. White piedra
4. Trichodystrophies (monilethrix and trichorrhexis nodosa)
5. Psoriasis
6. Hair splash garbage
7. Seborrheic dermatitis
8. Psocids (book lice)

### B. *Differential diagnosis*

Differential diagnosis includes inner root sheath remnants (hair casts), as well as black and white piedra, due to *Piedraia hortae* and *Trichosporon beigeli*. (Schwartz RA et al. 2004) Trichodystrophies, such as monilethrix and trichorrhexis nodosa, and scalp conditions such as

psoriasis and eczema have also been mistaken with nits on gross examination. Nits can also be confused with debris on the hair shaft left by hair spray, dandruff, or accumulated flakes of seborrheic dermatitis. (Schwartz RA et al. 2006). As opposed to nits, hair casts and flakes are freely movable along the hair shaft. The correct diagnosis can be established by microscopic examination (Table). Psocids are lice-like insects (booklice) that can rarely cause human scalp infestation; they are readily differentiated from human lice by their larger heads, large mouthparts, large hind legs, and long antennae. (Durden, LA et al. 2002)

## IX. TREATMENT

For treatment see infective person as well as those who are closely contact with live lice's. Wash bed sheets, pillows, cloths, towels, infected animals in hot water above 50°C or in machine for 30 minutes and caps, hements, handkerchief, hairbrushes cleaned with insecticides or alcohol. Vacuum the carpets, pillows, floors, household items and furniture to shed eggs of lices, killing lices and ova are best way to treatment. There are three basic ways used for treatment of lices , Tropical pediculicides, Wet combing and Oral therapy. Failure in treatment is due to improper handling or use chemicals not use for children lower than the age of 2 years. (I. Nutanson and C.J. Steen et al. 2008)

### A. Tropical agents

#### Pyrethrin

Firstly shampooed the hairs and then apply 1%<sup>^</sup>Permethrin cream, leave it for 10 minutes and after this rinse off. This may paralyzed the nerves in exoskeleton muscles that allows the lice to breath and it's a adequate treatment reapplied after 7 -10 days

later ensures 95% cure rate but prevalence of this unknown. (I. Nutanson, and C.J. Steen et al. 2008)

#### Pyrethrins and Piperonyl butoxide

This obtained from chrysanthemum extracts that is neurotoxin to lice and cause reaction in individuals allergic to ragweed. Shampooed hairs with it left for 10 minutes before rinse off. It requires reapplication after 7 to 10 days because 20 to 30 % viable eggs remains after first treatment and adult lices also show resistance. (Burkhart CG et al. 1998)

#### Malathion 0.5%

Acetylcholin esterase inhibitor (organophosphate) attack on respiratory system of insects .This lotion apply to hair, left for air dry and wash, also reapplied after 7-10 days and hair straiters and dryers also avoided during treatment.(Roberts RJ et al. 2002)

#### Permethrin

This cream applied in 5% quantity and for overnight before washing 1% lotion is not effective(52). (Abramowicz et al. 1997)

#### Crotamiton

US prescribed 10% crotamiton lotion scalped and left for 1 day before washing. Effect on children, youngs and pregnant women were not calculated. (Yawalkar SJ et al. 1998)

#### Carbaryl 0.5%

This only examined in US prescriptions and act as organophosphate by binding of carbamate with acetylcholine esterase. Carbaryl 0.5% shows 100% result in 81 participants in the UK in 1981. According to Department of Health in the UK acknowledges carbaryl that belongs to carbamate

family of chemicals has mutagenic potential. (Stafford KA et al. 2002)

### **Lindane 1%**

This has nervous system toxicity in humans and causes seizures effect in childrens. Its use in the form of shampoo with repeated application after 7-10 days and has resistance (56). (Taplin D et al. 1995)

### **Pediculicides resistance**

Not only insecticides are 100% ovicidal (kill an ovum) and also resisting. A study was conducted in USA in 2000 from which it was concluded that the high resistance of Permethrin, Phenothrin and Metathion was present, and 87% failure rate for the Permethrin and 64% failure of Malathion with tropical treatment .( Dawes M et al. 2000)

No reports of Melathion was in US and the resistance prevalence is also unknown .Several possible explanation of the mis diagnose, noncompliance, reinfestation was discovered with a persistant case of head lice. (Heming way J et al. 1995)

### **Nit removal after treatment with a Pediculicide**

Removal of the nit with fine tobithed nit comb after treatment of any product is recommended. Although number of the pediculicide 100% are ovicidal. The removal of the nit is difficult and time consuming also. (*Arch Dis Child.et al. 1996*)

Removal of nits with lice comb is very easy when the hairs are wet with water or after use of shampoo or conditioner etc. Acidic solutions with ph 4.5-5.5 makes the hairs surface smoother and facilitate the slide of the eggs of hairs. (Burkhart CN et al 2006)

Some products are avoided that used for the loosen of the glue attaches to nit of the hair shaft. Vinegar or vinegar-based products are applied to hair for the 3 minutes before use of nits comb and no clinical benefit is recorded. (Arch Pediatr Adolesc Medet al. 1998). No any product is used in combination with the Permethion because it may interfere with the product activity. ( Frankowski BL et al. 2006)

### **Wet combing**

The removal of lice by the mechanical method with the use of wet combing is an opinion to insecticides. It is the fact that lice cannot move to another host within 7 days after hatching, and also not reproduce within 10 days, and all eggs will hatch within 7 to 10 days. So, if all young lice are combed out a few days after hatching, these can be removed completely. The combing must be done on wet hair with some lubricant (that remove the friction) thing such as oil or conditioner and is continued until all lice are removed. This procedure is used after 2-3 days. 38% cure was found in US by this procedure. In 2005 a new trial was done in the UK comparing the effects of a current Bug Buster® kit with the counting of pediculicides containing the chemicals such as malathion or permethrin. The cure rate with conditioner employing the Bug Buster® kit was found to be distinct and greater than that for counting kit pediculicides (57% v 13%) (Frankowski BL. Et al., 2002)

### **B. Oral agents**

#### **Sulfamethoxazole/Trimethoprim**

As it is used in omits media doses of these was shown to be effective against head louse on human. (Frankowski BL. and Weiner LB. 2006). This antibiotic is considered to kill the bacteria which

leave in an association in gut flora of the louse, and resist here for forming vitamin B. Due to which death occurs.(Burgess, I. 2002). This antibiotic was used in combination with permethrin 1%. The severe infections occurs that also includes the Stevens - Johnson syndrome and toxic epidermal necrolysis and is the cause the of the therapy if available. It is not used and approved by the FDA so not recomenended. (Frankowski BL. Et al., 2002)

### **Ivermectin**

Anti-helminthic agent structurally similar to the antibiotics used previous, but lonely used. A single dose is eaten of 200 micrograms/kg, regularly in 10 days, and was found effective. This agent is also recommended as a good alternative for treatment of man infections. This product is not currently approved and registered by the FDA, so it is also not recommended. (J Dermatol. et al.2005)

### **Levamisole**

The dose of 3.5 mg/kg once daily was suggest to used to be effective against pediculosis regularly for 10 days. (Delibas SB et al. 2006)

### **Albendazole**

One dose of 400 mg, or a 3-day course of albendazole 400 mg, is also effective, with a repetition of single dose of albendazole 400 mg after 7 days. Not any ever effect between albendazole and 1% permethrin was found. (Frankowski BL. Et al., 2002)

### **C. Occlusive agents**

The use of a “shampoo,” consisting of petroleum jelly is applied on the entire surface of the hair and

keeps as it overnight with a cap specific for showering, was recommended. (Burgess I., 2002).

By using this shampoo is required for the next 7 to 10 days to remove the entire waste. This substance stops the respiratory spiracles of the head louse to breath and hence the louse will kill. Another interpretation is that the intense attention to hair grooming results in removal of all the lice and nits. Hair pomades are easier to remove than petroleum jelly, but may not kill the eggs, and treatment should be repeated weekly for 4 weeks. Other occlusive substances have been suggested (mayonnaise, tub margarine, herbal oils, olive oil), but to date only anecdotal information is available regarding their efficacy. During the past year, two new products for treating head lice were released in the UK: 4% dimethicone (Hedrin®) lotion and Full Marks® solution. These products act by coating the louse and disrupting its ability to manage water. Hedrin® was found to cure at least 70% of cases in two clinical trials. There is no clinical evidence to support Full Marks® product effectiveness yet. A recent study suggests that Cetaphil® cleanser can be used as a dry-on, suffocation-based pediculicide lotion (NUVO® lotion), and is effective in the treatment of pediculosis capitis). However, the study was anecdotal, not a well-designed randomized trial, and did not use a proper method to make the diagnosis of head lice infestation. (I. Nutanson et al.2008)

### **D. Head lice repellents**

The insecticide residues left on hair shafts probably act as insect repellents even if the louse is resistant to the lethal effects of the insecticide. Piperonal is available as a head lice repellent spray. Lavender, citronella, and anise are also shown to be effective lice repellents in in-vitro studies. (Am J Clin

Dermatol et al. 2004). Citronella repellent formulation was found to be 3 to 4 times more effective than the placebo in protecting against head lice infestation. (Miller J. et al. 2004)

### **Conclusion**

Head lice infestation is caused by the head lice especially by *Pediculus humanus capitis* which is an important species causing the infestation. The percentage of head lice is more in girls as compared to boys because of some valuable reasons. The history of the head lice shows that it has been under observation from many years. Its prevalence is also written on the basis of the people more infested with head lice in an area. Head louse has three main parts of the body as other insects have i.e. head, thorax and abdomen. It has three stages in its life cycle: eggs, nymph or nits and adult. It is diagnosed on the basis of different factors mentioned above. Its genetics and infestation is also mentioned. There are different methods for the treatment and for the removal of head lice depending upon the conditions. Some are more effective than others. The head lice may be treated by caring keep in viewing some important points that are described.

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