International Journal of Research in Dermatology
*Monisha BM et al. Int J Res Dermatol. 2018 Aug;4(3):357-362*
http://www.ijord.com

DOI: http://dx.doi.org/10.18203/issn.2455-4529.IntJResDermatol20183158

**Original Research Article**

# Comparison of efficiency of 1% permethrin lotion vs. 0.5% ivermectin shampoo in the treatment of pediculosis capitis

**B. M. Monisha[1], M. Madhumitha[1]*, S. Thilagavathi[2]**

Department of Dermatology, Venereology and Leprology, [1]Vinayaka Mission Kirupananda Variyar Medical College and Hospitals, [2]Private Practice, Salem, Tamil Nadu, India

**Received:** 15 March 2018
**Revised:** 10 June 2018
**Accepted:** 15 June 2018

***Correspondence:**
Dr. M. Madhumitha,
E-mail: hi_hi_sandy@yahoo.co.in



## ABSTRACT

**Background:** Pediculosis or head louse infestation is a common condition and an issue of concern in developing countries. Various treatment options are available for the management of this condition but still needs further research due to drug resistance. This study seeks to compare the efficacy of 1% permethrin lotion and 0.5% ivermectin shampoo in the management of pediculosis capitis.
**Methods:** A prospective longitudinal study was conducted in a tertiary care hospital from September 2013 to June 2015. Patients presenting with pediculosis capitis infestation were divided into two groups of 50 each. They were treated with either topical 1% permethrin lotion or 0.5% ivermectin shampoo. Follow up was done once in 4 weeks on the extent of head lice infestation.
**Results:** After being treated with either topical 1% permethrin or 0.5% ivermectin shampoo, the presence of nits decreased significantly in the ivermectin group. Number of patients either had no nits or less than 5 dead nits in the permethrin group than in the ivermectin group.
**Conclusions:** It is concluded that both 1% permethrin and 0.5% ivermectin have comparable efficacies in managing pediculosis capitis infestation, but permethrin was found to be more effective in treatment. In addition, none of the participants in both the treatment groups experienced any side effects. This is one of the very few studies exploring the treatment efficacy of topical ivermectin and the potential scope for future studies on the treatment options for pediculosis capitis.

**Keywords:** Pediculosis capitis, Ivermectin, Permethrin, Ectoparasites

## INTRODUCTION

Pediculosis capitis is an infestation by a parasite *Pediculus human* is capital. Pediculosis capitis or head louse infestation is an endemic problem in both developing and developed countries. It especially affects the pediatric age group. Pruritus of the scalp is the common symptom, and viable nits on scalp confirm the infestation.[1] It has multiple physiologic, economic and psychological impacts. In addition, head lice are also vectors of pathogens. There have been reported where head louse infestation has been linked to poor learning performance and Iron deficiency anemia.[2,3] Reports from various countries show the prevalences ranging from 15% to 20%.[4-6] Various factors are associated with head louse infestation. Some of them include female gender, low and middle socioeconomic status, household members more than 4, history of contact with an infected person, rural area, poor personal hygiene and age of more than 10 years.[6-9]

Pediculosis is a significant issue in India as well. In a community-based survey by Srivastava et al estimated the prevalence of pediculosis to be 69% in the community and 54% among school children.[10] Another study conducted in Delhi estimated the overall prevalence among school children to be 16.59%. Girls (20.42%) were found to be significantly more infested than boys (13.86%).[11]

Various treatment options are available for pediculosis capitis. Some of them are topical Ivermectin, Malathion, Benzyl alcohol, spinosad, Lousebuster, and Dimeticones.[12] Permethrin applied as a dust or spray in clothing and bedding is another treatment option available.[5,13,14] In addition, it is recommended that environmental management and preventive measures should also be undertaken for preventing recurrence of head louse infestation. Despite the treatment options available, difficulties persist due to children's refusal to be treated, the persistence of nits, stigma, and exclusion from settings such as schools.[15,16] Due to the adaptability of head lice, resistance to drugs have also emerged.[14]. Over the years, the efficacy of permethrin has also declined and now not much of use.[17]

There have been various studies comparing the efficacy of interventions. A study was conducted on assessing the efficacy of oral ivermectin comparing to d-phenothrin in the treatment of head louse. At the end of the 15-day post-treatment period, the efficacy of the Ivermectin treatment group was 77.4%, compared to 32.3% in the d-phenothrin group.[18] Another study conducted in Mexico reported that a single dose of ivermectin at 200 mug/kg eradicated all the adult lice. A second dose was needed only among 41% of children due to the presence of nits.[19] A clinical trial comparing the efficacy of albendazole alone and in combination with permethrin was conducted, showing no synergistic effect between the two drugs.[20] The authors recommended oral albendazole as a viable treatment option for pediculosis. Another study comparing d-phenothrin with malathoin found the former to be superior in pediculicidal effects.[10] Thiabendazole, levamisole are some other options explored for pediculosis.[21]

Despite the varying options available, there is an increasing need for exploring further treatment options for the burden of pediculosis, since reports of treatment failure and emergence of drug resistance have become increasingly common. In addition, there are many unanswered questions on the epidemiology of head louse transmission, treatment and preventing drug resistance. There still remains a need to find a consensus on treatment, and to whether the evidence found is of real value.[22,23] Furthermore, due to the toxicity of various pediculicides, research is needed for avoiding the indiscriminate use of these chemicals.[24]

## METHODS

### *Study area*

Vinayaka Missions Kirupananda Variyar Medical College and Hospital, Salem.

### *Study design*

Prospective longitudinal study.

### *Study period*

September 2013 to June 2015.

### *Study population*

All patients were presenting with pediculosis capitis to the department of skin and STD of Vinayaka Missions Kirupananda Variyar medical college and Hospital, Salem.

### *Study sample*

100 cases.

### *Sampling technique*

Non-random Purposive sampling.

### *Inclusion criteria*

Inclusion criteria were children between the age group of 5-25 years of age.

### *Exclusion criteria*

Exclusion criteria were hypersensitivity to the drug.

### *Method of data collection*

After getting the institutional ethical clearance, 100 patients were divided into 2 groups, Group A and Group B with 50 patients in each group. Group A patients were given 1% permethrin lotion and Group B patients were given 0.5% ivermectin shampoo. The patients were advised to use lotion or shampoo on a single application and were asked to come for Follow up every week for 4 weeks. Every week complete dermatological examination was carried out in all the frontal, temporal, parietal, an occipital region both by visually and by using the magnifier lens. The outcome measurement was based on the on the symptoms of itching and the number of parasites present over the scalp region.

### *Data entry and analysis*

The data was entered in MS Excel and analysed using SPSS Version 23.0. The numerical variables such as age, mean duration etc. was expressed in mean with standard deviation. The categorical variables were expressed in

percentages. T-test was used to compare the mean age between the two groups. Chi square test was used to compare the proportion of participants between the two groups with respect to the baseline characteristics and the proportion of participants with different grades of nits before and after treatment. P value of less than 0.05 was taken as statistically significant.

## RESULTS

Among the ivermectin group mean of age was 12.24 (3.70) and among the permethrin group mean of age was 11.54 (3.90). Among the ivermectin group 15 (30%) people were aged between 5-10, 28 (56%) were aged between 11-15, 5(10%) were aged between 16-20, 2(4%) were added between 21-25. Among the permethrin group, 23(46%) were aged between 5-10, 24 (48%) were aged between 11-15 and 3(6%) were aged between 21-25. The difference between the groups and age group was statistically not significant (P value-0.649). Among the ivermectin group 10 (20%) people were male, 40 (80%) were female. Among the permethrin group, 12(24%) were males and remaining 38(76%) were female. The difference between the groups and gender was statistically not significant (P value-0.568). Among the ivermectin group, 6 (12%) people belonged to the urban place of residence, 44 (88%) belonged to rural. Among the permethrin group 4 (8%) were belongs to urban and remaining 46 (92%) belonged to rural. The difference between the groups and place of residence was statistically not significant (P value-0.684). Among the ivermectin group 50 (100%) people had to itch, among the permethrin group 50 (100%) people had to itch. Among the ivermectin group 2 (4%) had <1 month duration of itching, 6 (12%) had 1-3 months, 10 (20%) had 4-6 months, 19 (38%) had 7-12 months, 10 (20%) had >1-2 years and 3 (6%) had >2 years. Among the permethrin group 6 (12%) had <1 month, 14 (28%) had 1-3 months, 14 (28%) had 4-6 m0nths, 18(36%) had 7-12 months, 6 (12%) had >1-2 years, 6 (12%) had 2 years duration of itching. Among the ivermectin group 3 (16%) people were done hair washing daily, 24 (48%) were done once weekly, 15 (30%) were done twice weekly, 8 (16%) were done thrice weekly. Among the permethrin group, 6 (12%) were done daily, 21 (42%) were done once weekly, 15 (30%) were done twice weekly and remaining 8 (16%) were done thrice weekly. The difference between the groups and place of residence was statistically not significant (p>0.05) (Table 1).

**Table 1: Comparison of baseline parameters between two groups (n=100).**

| Parameter | Ivermectin group (n=50) | Permethrin group (n=50) | P value |
|---|---|---|---|
| | N (%) | N (%) | |
| **Age (Mean±SD)** | 12.24 (3.70) | 11.54 (3.90) | |
| **Gender** | | | |
| Male | 10 (20) | 12 (24) | 0.568 |
| Female | 40 (80) | 38 (76) | |
| **Place of residency** | | | |
| Urban | 6 (12) | 4 (8) | 0.684 |
| Rural | 44 (88) | 46 (92) | |
| **Duration of itching** | | | |
| <1 month | 2 (4) | 0 (0) | ** |
| 1-3 months | 6 (12) | 6 (12) | |
| 4-6 months | 10 (20) | 14 (28) | |
| 7-12 months | 19 (38) | 18 (36) | |
| >1-2 years | 10 (20) | 6 (12) | |
| >2 years | 3 (6) | 6 (12) | |
| **Frequency of hair washing** | | | |
| Daily | 3 (6) | 6 (12) | 0.093 |
| Once weekly | 24 (48) | 21 (42) | 0.738 |
| Twice weekly | 15 (30) | 15 (30) | 1.000 |
| Thrice weekly | 8 (16) | 8 (16) | 1.000 |
| **Level of hygiene** | | | |
| Good | 41 (82) | 41 (82) | 1.000 |
| Poor | 9 (18) | 9 (18) | |

Among the ivermectin group mean of height was 132.4 (15.8) and among the permethrin group, mean of height was 132.6 (10.7). Among the ivermectin group 15 (30%) people had the height between 100-120 cm, 20 (40%) people had 121-140 cm, 15 (30%) had 141-160 cm. Among the permethrin group 8 (16%) had 100-120 cm, 27 (54%) had 121-140 cm, 15 (30%) had 141-160 cm. The difference between the groups and place of residence was statistically not significant (p>0.05) (Table 2).

**Table 2: Distribution of study population based on their height (n=100).**

| Height (in cm) | Ivermectin group (n=50) | | Permethrin group (n=50) | | P value (by chi square test) |
|---|---|---|---|---|---|
| | Frequency | Percentage (%) | Frequency | Percentage (%) | |
| **100-120** | 15 | 30 | 8 | 16 | 0.0421 |
| **121-140** | 20 | 40 | 27 | 54 | 0.739 |
| **141-160** | 15 | 30 | 15 | 30 | 1.00 |
| **Mean (SD)** | 132.4 (15.8) | | 132.6 (10.7) | | |

**Table 3: Distribution of study population based on their weight (n=100).**

| Weight (in kgs) | Ivermectin group (n=50) | | Permethrin group (n=50) | | P value (by chi square test) |
|---|---|---|---|---|---|
| | Frequency | Percentage (%) | Frequency | Percentage (%) | |
| **10-20** | 15 | 30 | 11 | 22 | 0.0871 |
| **21-40** | 27 | 54 | 32 | 64 | 0.629 |
| **41-60** | 8 | 16 | 7 | 14 | 0.978 |
| **Mean (SD)** | 132.4 (15.8) | | 132.6 (10.7) | | |

**Table 4: Dermatological examination showing the presence of nits among the study population at the start of treatment.**

| Site | Grading | Ivermectin group (n=50) | Permethrin group (n=50) | P value (chi square test) |
|---|---|---|---|---|
| | | N (%) | N (%) | |
| **Occipital area** | Grade 1 (<5 nits) | 5 (10) | 8 (16) | 0.738 |
| | Grade 2 (5-10 nits) | 8 (16) | 10 (20) | 0.816 |
| | Grade 3 (>10 nits) | 37 (74) | 32 (64) | 0.491 |
| **Temporal area** | Grade 1 (<5 nits) | 3 (6) | 4 (8) | 0.894 |
| | Grade 2 (5-10 nits) | 10 (20) | 14 (28) | 0.618 |
| | Grade 3 (>10 nits) | 37 (74) | 32 (64) | 0.548 |
| **Retroauricular area** | Grade 1 (<5 nits) | 30 (60) | 32 (64) | 0.873 |
| | Grade 2 (5-10 nits) | 15 (30) | 16 (32) | 0.895 |
| | Grade 3 (>10 nits) | 5 (10) | 2 (4) | 0.581 |

**Table 5: Distribution of the study population based on the presence of nits during the follow up period of treatment.**

| Fallow up visit | Presence of nits | Treatment | | P value |
|---|---|---|---|---|
| | | Ivermectin group (n=50) | Permethrin group (n=50) | |
| | | N (%) | N (%) | |
| **1st visit** | Grade 1 (no units) | 0 (0) | 2 (4) | 0.0782 |
| | Grade 2 (<5 dead units) | 16 (32) | 17 (34) | 0.952 |
| | Grade 3 (5-10 live units) | 26 (52) | 22 (44) | 0.386 |
| | Grade 4 (>10 live and dead units) | 8 (16) | 9 (18) | 0.873 |
| **2nd visit** | Grade 1 (No units) | 2 (4) | 4 (8) | 0.064 |
| | Grade 2 (<5 dead units) | 19 (38) | 23 (46) | 0.071 |
| | Grade 3 (5-10 live units) | 17 (34) | 16 (32) | 0.952 |
| | Grade 4 (>10 live and dead units) | 12 (24) | 7 (14) | 0.0578 |
| **3rd visit** | Grade 1 (No units) | 2 (4) | 8 (16) | 0.031 |
| | Grade 2 (<5 dead units) | 23 (46) | 29 (58) | 0.067 |
| | Grade 3 (5-10 live units) | 17 (34) | 10 (20) | 0.004 |
| | Grade 4 (>10 live and dead units) | 8 (16) | 3 (6) | 0.004 |
| **4th visit** | Grade 1 (No units) | 8(16) | 12 (24) | <0.001 |
| | Grade 2 (<5 dead units) | 32 (64) | 38 (76) | 0.052 |
| | Grade 3 (5-10 live units) | 5 (10) | 0 (0) | <0.001 |
| | Grade 4 (>10 live and dead units) | 5 (10) | 0 (0) | <0.001 |

Among the ivermectin group mean of weight was 132.4 (15.8) and among the permethrin group mean of height was 132.6 (10.7). Among the ivermectin group 15 (30%) people had weight between 10-20 kg, 27 (54%) people had 21-40 kg, 8 (16%) had 41-60 kg. Among the permethrin group 11 (22%) had 10-20 kg, 32 (64%) had 21-40 kg, 7 (14%) had 41-60 kg. The difference between the groups and place of residence was statistically not significant (P value->0.05) (Table 3).

Among the ivermectin group 5 (10%) people had grade 1 (<5 nits) present in the occipital area, 8 (16%) had grade 2 (5-10 nits), 37 (74%) had grade 3 (>10 nits). Among the permethrin group 8 (16%) had grade 1 (<5 nits), 10 (20%) had grade 2 (5-10 nits), 32 (64%) had grade 3 (>10 nits). Among the ivermectin group 3 (6%) people had grade 1 (<5 nits) present in the temporal area, 10 (20%) had grade 2 (5-10 nits), 37 (74%) had grade 3 (>10 nits). Among the permethrin group 4 (8%) had grade 1 (<5 nits), 14 (28%) had grade 2 (5-10 nits), 32 (64%) had grade 3 (>10 nits). Among the ivermectin group 30 (60%) people had grade 1 (<5 nits) present in the retro-auricular area, 15 (30%) had grade 2 (5-10 nits), 5 (10%) had grade 3 (>10 nits). Among the permethrin group 32 (64%) had grade 1 (<5 nits), 16 (32%) had grade 2 (5-10 nits), 2 (4%) had grade 3 (>10 nits). The difference between the group's presence of nits grading was statistically not significant (P value >0.05) (Table 4).

Among the ivermectin group 2 (4%) had grade 1 (no nits), 19 (38%) people had grade 2 (<5 dead units), 17 (34%) had grade 3 (5-10 live nits), 12(24%) had grade 4 (>10 live and dead nits). Among the permethrin group 4 (8%) had grade 1 (no nits), 23 (46%) had grade 2 (<5 dead nits), 16 (32%) had grade 3 (5-10 live nits) and 7 (14%) had grade 4 (>10 live and dead units present during 2 and follow up visit. Among the ivermectin group 2 (4%) had grade 1 (no nits), 23 (46%) people had grade 2 (<5 dead units), 17 (34%) had grade 3 (5-10 live nits), 8 (16%) had grade 4 (>10 live and dead nits). Among the permethrin group 8 (16%) had grade 1 (no nits), 29(58%) had grade 2 (<5 dead nits), 10 (20%) had grade 3 (5-10 live nits) and 3 (6%) had grade 4 (>10 live and dead units present during 3rd follow up visit. Among the ivermectin group 8 (16%) had grade 1 (no nits), 32 (64%) people had grade 2 (<5 dead units), 5 (10%) had grade 3 (5-10 live nits), 5 (10%) had grade 4 (>10 live and dead nits). Among the permethrin group 12 (24%) had grade 1 (no nits), 38 (76%) had grade 2 (<5 dead nits) present during 4th follow up visit (Table 5).

## DISCUSSION

**A** majority of the study participants belonged to the adolescent age group. There was no statistically significant difference among both the treatment groups. The male: female ratio is 1:4 in both groups. Majority of

the study population hailed from the rural areas among both the intervention groups. The itching was present among all the participants in both the groups. Around 30% of the population was infested with adult pediculi. This estimate is much lesser than the prevalence of 69% as estimated by Srivatsava et al but higher than the prevalence of 15 to 20% among developing countries.[4-6,10] Few patients had other symptoms such as crusting and lymph node enlargement. Most participants had a long duration if itching for more than 4 months. Very few participants reported washing their hair daily. Most reported washing their hair 1-3 times a week. The scalp hygiene level was comparable among both the treatment groups. The mean height and weight were comparable among both the groups. On examination, a majority of the participants were found to be having grade 2 to 3 nit infestation in the occipital and temporal area and grade 1 nit infestation in the retroauricular area. The grades of infestation were not statistically significant between the two groups.

During follow up visits, there was a statistically significant difference in the presence of nits between the permethrin and ivermectin groups. By the end of the 4$^{th}$ follow up visit, no participants in the permethrin group had Grade 3 and 4 infestations, while in the Ivermectin group, the proportion of participants with grade 3 and 4 infestations were 10% each. This lesser efficacy of ivermectin is similar to a study by Leulmi et al where there was evidence suggestive of emerging resistance to ivermectin.[18] There were more participants in the permethrin group who had either no nits or less than 5 dead nits than in the ivermectin group. The difference was statistically significant (p<0.05).

## CONCLUSION

In conclusion, the study participants had a comparable proportion of infestation with pediculosis similar to other studies in India. They also had multiple risk factors such as poor hair washing practices, school age group and hailing from the rural population. According to the study results, the efficacies of 1% permethrin lotion are almost comparable with 0.5% ivermectin shampoo. But, on subsequent follow up visits, 1% permethrin shampoo was found to be superior in treating pediculosis capitis. Furthermore, none of the participants in the study group experienced any adverse effects. This is one of the few studies exploring the efficacy of topical ivermectin comparing to others which explore the efficacy of oral ivermectin. Hence, this provides the scope for further clinical research to substantiate the findings and thus reduce the burden due to pediculosis in the population.

*Funding: No funding sources*
*Conflict of interest: None declared*
*Ethical approval: The study was approved by the institutional ethics committee*

## REFERENCES

1. Madke B, Khopkar U. Pediculosis capitis: an update. Indian J Dermatol Venereol Leprol. 2012;78(4):429-38.

2. Burke S, Mir P. Pediculosis causing iron deficiency anaemia in school children. Arch Dis Child. 2011;96(10):989.
3. Abd El Raheem TA, El Sherbiny NA, Elgameel A, El-Sayed GA, Moustafa N, Shahen S. Epidemiological comparative study of pediculosis capitis among primary school children in Fayoum and Minofiya governorates, Egypt. J Community Health. 2015;40(2):222-6.
4. Feldmeier H. Treatment of pediculosis capitis: a critical appraisal of the current literature. Am J Clin Dermatol. 2014;15(5):401-12.
5. Feldmeier H. Pediculosis capitis - an update. MMW Fortschr Med. 2017;159(7):39-42.
6. Lye MS, Tohit NF, Rampal L. Prevalence and predictors of pediculosis capitis among primary school children in Hulu Langat, Selangor. Med J Malaysia. 2017;72(1):12-7.
7. Bartosik K, Buczek A, Zajac Z, Kulisz J. Head pediculosis in schoolchildren in the eastern region of the European Union. Ann Agric Environ Med. 2015;22(4):599-603.
8. Lesshafft H, Baier A, Guerra H, Terashima A, Feldmeier H. Prevalence and risk factors associated with pediculosis capitis in an impoverished urban community in lima, peru. J Glob Infect Dis. 2013;5(4):138-43.
9. Tagka A, Lambrou GI, Braoudaki M, Panagiotopoulos T, Papanikolaou E, Laggas D. Socioeconomical Factors Associated With Pediculosis (Phthiraptera: Pediculidae) in Athens, Greece. J Med Entomol. 2016;53(4):919-22.
10. Srivastava R, Yadav JD, Tilak VW. Comparative efficacy of d-phenothrin and malathion in the control of pediculosis. Med J Armed Forces India. 1996;52(3):172-4.
11. Khokhar A. A study of pediculosis capitis among primary school children in Delhi. Indian J Med Sci. 2002;56(9):449-52.
12. Bohl B, Evetts J, McClain K, Rosenauer A, Stellitano E. Clinical Practice Update: Pediculosis Capitis. Pediatr Nurs. 2015;41(5):227-34.
13. El-Bahnasawy MM, Abdel FE, Morsy TA. Human pediculosis: a critical health problem and what about nursing policy? J Egypt Soc Parasitol. 2012;42(3):541-62.
14. Meinking TL. Clinical update on resistance and treatment of Pediculosis capitis. Am J Manag Care. 2004;10(9):264-8.
15. Gunning K, Pippitt K, Kiraly B, Sayler M. Pediculosis and scabies: treatment update. Am Fam Physician. 2012;86(6):535-41.
16. Ozkan O, Sikar-Akturk A, Mert K, Bilen N, Mumcuoglu KY. Difficulties experienced by families following unsuccessful treatment of Pediculosis capitis: the mothers' perspective. Turkiye Parazitol Derg. 2012;36(2):82-6.
17. Vinuelas J. Permethrin-resistant pediculosis. Enferm Infecc Microbiol Clin. 2001;19(5):236-7.
18. Leulmi H, Diatta G, Sokhna C, Rolain JM, Raoult D. Assessment of oral ivermectin versus shampoo in the treatment of pediculosis (head lice infestation) in rural areas of Sine-Saloum, Senegal. Int J Antimicrob Agents. 2016;48(6):627-32.
19. Ameen M, Arenas R, Villanueva-Reyes J, Ruiz-Esmenjaud J, Millar D, Dominguez-Duenas F, et al. Oral ivermectin for treatment of pediculosis capitis. Pediatr Infect Dis J. 2010;29(11):991-3.
20. Akisu C, Delibas SB, Aksoy U. Albendazole: single or combination therapy with permethrin against pediculosis capitis. Pediatr Dermatol. 2006;23(2):179-82.
21. Namazi MR. Treatment of pediculosis capitis with thiabendazole: a pilot study. Int J Dermatol. 2003;42(12):973-6.
22. Burgess IF. Current treatments for pediculosis capitis. Curr Opin Infect Dis. 2009;22(2):131-6.
23. Wolf R, Davidovici B. Treatment of scabies and pediculosis: facts and controversies. Clin Dermatol. 2010;28(5):511-8.
24. Hernandez Contreras N, Menendez Diaz Z, Montada Dorta D, Isla Garcia M, Vega Correa E. Side effects of lindane in children with pediculosis. Rev Cubana Med Trop. 2000;52(3):228-9.


**Cite this article as:** Monisha BM, Madhumitha M, Thilagavathi S. Comparison of efficiency of 1% permethrin lotion vs. 0.5% ivermectin shampoo in the treatment of pediculosis capitis. Int J Res Dermatol 2018;4:357-62.