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Original Article

Comparison of Oral Ivermectin and Permethrin 5% Lotion in Treatment of Pediculosis Capitis

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ABSTRACT

Objective: To study the efficacy of oral Ivermectin compared with Permethrin 5% lotion for pediculosis capitis management.
Study Design: Randomized controlled trial.
Place and Duration of Study: Department of Dermatology, Combined Military Hospital, Abbottabad Pakistan, from Mar to Aug 2022.
Methodology: We enrolled 60 patients, aged between 8 to 36 years. Group A, with 30 patients, was given topical 5% Permethrin lotion in two applications, seven days apart. Group B, also with 30 patients and having more than 15 kg weight, was given oral Ivermectin 200 microgram per kilogram on Day 1 and repeated after 7 days with patients reassessed at Day 7 and 15. Demographic information along with frequency and percentages were calculated for qualitative variables by using SPSS version 26.0. To determine statistical significance, *p*-value of ≤0.05 was set as significant, and χ2-square test was used.
Results: On comparison of efficacy in group A (Permethrin-5%) only 14(46.6%) of the patients showed complete recovery, however, the majority 16(53.4%) of patients needed second dose and a few still had symptoms, while in group B (oral Ivermectin) majority 25(83.3%) of patients recovered at first dose whereas only 5(16.7%) patients needed second dose for complete recovery and no single patient had any symptoms after administration of second dose (*p*-value≤0.05).
Conclusions: The effectiveness of oral Ivermectin was much greater than that of 5% Permethrin lotion.

Keywords: Ivermectin, pediculosis, permethrin.

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INTRODUCTION

In children, pediculosis is a common ectoparasitic infestation with infestation of head lice (pediculus humanus capitis) causing a variety of physical symptoms, including pruritus, excoriation, cervical lymphadenopathy, and conjunctivitis.[1] It also has a number of negative social consequences, including parental anxiety and stigmatization of children,[2] becoming a significant public health issue primarily affecting school-aged children between the ages of 8 to 13 years. In developing nations, prevalence rates of up to 40% have been reported,[4] while in Pakistan, four urban areas of one province reported a frequency of 36.7%,[5] with people from low socioeconomic background and poor hygiene more likely to be affected.[6] Pediculosis capitis has been treated using a variety of treatment modalities. Permethrin and Ivermectin have been prescribed for use topically or orally. Permethrin is a pyrethroid neurotoxic that targets voltage-sensitive sodium ion receptors in the neurological system of the insect, triggering nerve depolarization, hyperexcitation, muscular paralysis, and, eventually, parasite death.[7,8] Ivermectin is an antiparasitic medication, used to treat diseases like lymphatic filariasis, and ectoparasite infestations, as it binds to glutamate gated chloride ion receptors of invertebrates and disrupts neurotransmission.[9] The rationale of this study was to compare effectiveness of oral Ivermectin versus topical Permethrin in management of pediculosis as topical medication overuse is problematic and had led to drug resistance.[10]

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METHODOLOGY

This randomized controlled trial was done in Department of Dermatology, Combined Military Hospital, Abbottabad Pakistan, from March to August 2022, after obtaining Ethics Review Board approval through letter Reg# CMHAtd-ETH-21-Derm-22) and registration of trial using ClinicalTrials.gov Identifier: NCT05643820. We enrolled 60 patients, aged between 8 to 36 years, after obtaining informed consent from all patients and their caregivers. Non-probability consecutive sampling technique was used. Our sample size was calculated with 95% confidence interval, power of study as 80%, the expected cure rate of oral Ivermectin as 86.7% and Permethrin-5% less than 50%. The calculated sample size was 34 with 17 in each group, however sample size of 60 was taken with 30 in each group, to increase the validity of the study.[11]

Inclusion Criteria: Patients belonging to either gender, aged between 8 to 36 years, weight greater than 15 kg and having head lice as determined by combing wet hair with a fine-toothed detection comb for live lice and confirmed under lab microscope.

Exclusion Criteria: Pregnant or breastfeeding women, use of any pediculicidal medication within the preceding two weeks of treatment, and a hairstyle that was difficult to comb.

In group A, 30 patients were given topical 5% Permethrin lotion as two applications, seven days apart and in group B, 30 patients, having more than 15 kg weight, were treated with oral Ivermectin, 200 microgram per kg on day one and repeated after 7 days with patients reassessed at day 7 and 14. Treatment was categorized as effective by the complete clearance of associated symptoms, especially live lice on 15th day after medication. All inspections and therapy evaluations were completed by the researcher, under the supervision of a senior specialist dermatologist. All collected data was analyzed by using Statistical Package for the Social Sciences (SPSS) version 26.0 and statistical significance was determined by using *p*-value≤0.05 as significant.

RESULTS

All sixty patients were randomly allocated to one of two groups, these being group A (Permethrin-5%) with mean age 16.43±6.49 years, and group B (oral Ivermectin) with mean age 22.56±8.30 years. Table-I shows baseline clinical findings in both treatment groups. There is a significant relation between age and socio-economic status of patients between both groups (*p*-value<0.05). While age of patients ranged from 8 to 36 years, nevertheless, the majority 39(65%) were females in both groups with most of the patients 32(53.3%) belonging to lower class (*p*-value<0.05). Table-II shows a comparison of efficacy before treatment, at 7th day and at 15th day of treatment, in group A, where only 14(46.6%) of the patients showed complete clearance of live lice, however, 16(53.4%) patients needed a second dose at day 15th for complete recovery, but few still had mild symptoms (Figure-1). In contrast, in group B, 25(83.3%) patients recovered after administration of first dose whereas only 5(16.7%) patients needed a second dose for complete recovery and no patient had any symptoms after second dose administration. There was also a significant relationship between both groups which showed oral Ivermectin having higher efficacy than Permethrin-5% (*p*<0.05), as shown in Figure-3.

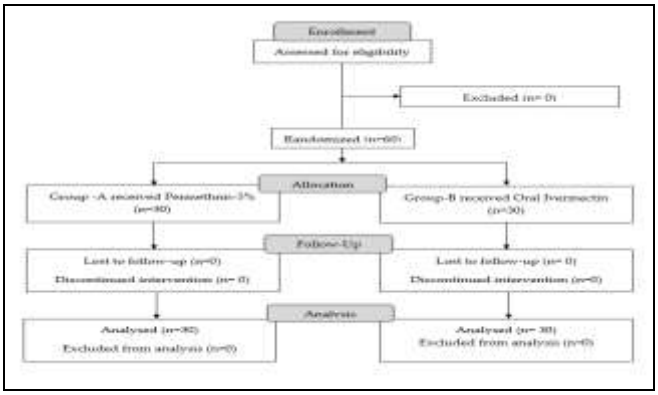

Figure-1: Patient Flow Diagram (n=60)

Table-I: Baseline Clinical Findings in Both Groups (n=60)

Variables		Permethrin 5%(n=30)	Ivermectin (n=30)	*p*-value≤ 0.05
Gender	Male	12(40%)	09(30%)	0.417
	females	18(60%)	21(70%)	
Age	Mean±SD	16.43±6.49	22.56±8.30	0.018
Weight	<60 kg	22(73.3%)	16(53.3%)	0.108
	≥60-80 kg	08(26.7%)	14(46.7%)	
Socio-economic status	Upper	0(0%)	06(20%)	0.004
	Middle	16(53.3%)	06(20%)	
	lower	14(46.7%)	18 (60%)	

Table-II: Comparison of Efficacy at 7th and 15th Day of Treatment (n=60)

Response of dose	Permethrin 5%(n=30)	Oral Ivermectin (n=30)	*p*-value ≤0.05
After1st dose (7th day)	14(46.6%)	25(83.3%)	0.003
After 2nd dose (15th day)	16(53.4%)	05(16.7%)	

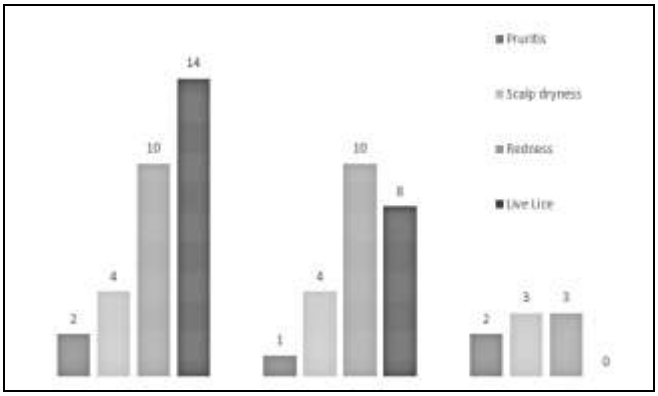

Figure-2: Symptoms of Pediculosis Capitis Before and After Treatment with Permethrin-5% (n=30)

DISCUSSION

We found that the majority 25(83.3%) of patients treated with oral Ivermectin recovered with no symptoms or toxicity as compared to the patients who were treated with Permethrin-5%, of which only 25(83.3%) recovered at first dose and there was a significant relation between both treatment groups

which showed that oral Ivermectin demonstrated considerably higher efficacy than Permethrin, which is similar to previously published evidence in literature.[11-14]

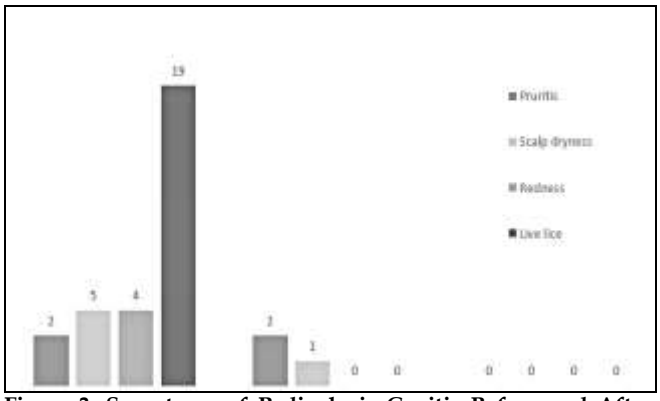

Figure-3: Symptoms of Pediculosis Capitis Before and After Treatment with Oral Ivermectin (n=30)

As Permethrin 1% is recommended only for management of lice infestation, it is topically applied on scalp for several hours or overnight before being washed off and to date, no case-control studies have shown its efficacy although according to one study, lice that are resistant to 1% Permethrin will also not succumb to higher concentrations.[15] Oral Ivermectin did not show any toxicity or adverse reaction in our study which is similar to the results of other studies, which also reported that oral Ivermectin is highly recommended in case of treatment failure, or any resistance reported while treating pediculosis.[16-17] Our study also showed significant relationship among demographic factors related to pediculosis capitis, such as age and socio-economic status (p-value≤0.05) which was similar to the study conducted by Kokturk *et al*.[18] We believe further studies with greater sample size are the need of the hour in order to analyze the efficacy as well as safety of these drugs in order to better treat patients with evidence-based management and rule out any potential adverse effects and the appropriate course of therapy should be individualized to each patient based on age and medication tolerance.

LIMITATION OF STUDY

The present study's limitation is that it was conducted over a comparatively short period of time. Dependent on the nature of the disease, large randomized multicenter trials with relatively long follow-ups are required to further confirm the results for assessing efficacy.

CONCLUSION

We found that the effectiveness of oral Ivermectin was much greater than that of 5% Permethrin lotion in treating pediculosis capitis.

Conflict of Interest: None.

Funding Source: None.

Authors' Contribution

The following authors have made substantial contributions to the manuscript as under:

HF & BM: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

MAS & MH: Conception, data analysis, drafting the manuscript, approval of the final version to be published.

DS & ZN: Data acquisition, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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