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RESEARCH ARTICLE

Comparative *in vitro* Tests on the Efficacy of Anti-Head-Lice Products Containing Stem Extract of Pyrethrum.

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ABSTRACT

Head lice (Pediculushumanuscapitis) occur worldwide and go with humans in all corners of the world .Although, in general, head lice do not transmit agents of disease as it is known from body lice (Pediculushumanuscorporis), they may have considerable impact on health of humans. The anti-lice property of dried flowers of Dalmatian Chrysanthemums was reported. Pyrethrum is a botanical insecticide produced from Dalmatian Chrysanthemums. In this study the anti-lice property of dried powders of stem of Dalmatian Chrysanthemums was investigated.

KEYWORDS: Anti-lice product-stem extract of pyrethrum-carrier oils.

INTRODUCTION:

Hair care is an overall term for parts of hygiene and cosmetology involving the hair on the human head. Hair care will differ according to one's hair type and according to various processes that can be applied to hair. All hair is not the same; indeed, hair is a manifestation of human diversity [(1)]. The common hair problems are Alopecia, Dandruff, Haircut Phobias, Hair Disease,Hair Loss, Head Lice, Human Hair Fleas, Oily Hair, Scalp Problems[(2)]

Lice infestation on the human body (also known as pediculosis) is very common. Cases number in the hundreds of millions worldwide. While lice can occasionally cause significant illness (typhus, relapsing fever, and trench fever), a lice infestation is generally more of an itchy and embarrassing experience than a serious medical problem. Three distinct presentations of lice infection exist and each is caused by a unique parasite [(3)]. Head lice are an emerging social problem, not only in economically poor countries but also in practically all other societies. Several of the common anti-louse products have lost at least in part their efficacy due to increasing resistance of lice against insecticides such as permethrin or allethrin. Other compounds, like lindan, were redrawn or banned due to high toxicity. Some recently developed products are based on dimethicones or cyclomethicones and turned out to be easily inflammable. Other styled medicinal products are based on plant extracts—some were proven of high efficacy—others of ineffectively [(4)]. Head lice (Pediculushumanuscapitis) are by far and away the most common infestation and favor no particular socioeconomic group. A genetically close "cousin," Pediculushumanuscorporis, is responsible for body lice and is more commonly associated with poverty, overcrowding, and poor hygiene. Pubic lice ("crabs") is caused by Pthirus pubis and is transmitted by intimate and/or sexual contact [(3)]. Lice infestation is a uniquely human experience. Lice do not jump or fly from host to host. They cannot be transmitted via animals but may be transferred by person to person via direct contact and by fomites (inanimate objects -- for example, caps, combs, sheets, etc) [(3)].

Three different types of lice infest people: They are Head lice, Body lice and Pubic lice.

HEAD LICE:

The head louse is a grey-white animal about 2 mm-3 mm in length (about the size of a sesame seed). The life span of the female louse is about one month. During this time, she will produce between seven to 10 eggs ("nits") per day and attach them firmly to the hair shaft region close to the scalp or body. These nits, which resemble dandruff, are attached with a glue-like, water-insoluble substance that makes them difficult to remove. After six to 10 days, the nits hatch as nymphs and become adults in 10 days. Head lice are the most common form of lice infestation. When treating head lice, supplemental measures can be combined with recommended medicine (pharmacologic treatment); however, such additional (non-pharmacologic) measures generally are not required to eliminate a head lice infestation. For example, hats, scarves, pillow cases, bedding, clothing, and towels worn or used by the infested person in the 2-day period just before treatment is started can be machine washed and dried using the hot water and hot air cycles because lice and eggs are killed by exposure for 5 minutes to temperatures greater than 53.5°C (128.3°F). Items that cannot be laundered may be dry-cleaned or sealed in a plastic bag for two weeks. Items such as hats, grooming aids, and towels that come in contact with the hair of an infected person should not be shared. Vacuuming furniture and floors can remove an infested person's hairs that might have viable

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nits attached [5]. The term "pyrethrum" refer to the powder made with the dried flowers of the chrysanthemum, whereas the term "pyrethrins" refer to the six insecticide components (pyrethrin 1, pyrethrin 2, cinerin 1, cinerin 2, jasmolin 1, and jasmolin 2 [20]) occurring naturally in the powder. These six pyrethrins constitute between 0.9% and 1.3% of the dried flowers. The word "pyrethrums" is the common latin name used for ornamental varieties developed from the Persian Chrysanthemum. The word "pyrethrums" is the common Latin name used for ornamental varieties developed from the Persian Chrysanthemum [6]. Anti-lice property of the powder edam with the dried flowers of the chrysanthemum was reported in previous studies. In this project, the anti-lice property of the ethanolic extract of stem of the chrysanthemum was investigated in the pure form as well as in the form of three anti head lice products and results are compared with the standard marketed product. The carrier oils were selected as per their beneficial effects [7, 8.9].

AIM AND OBJECTIVES:

To study the anti-lice property of pyrethrum stem extract and evaluate the anti-lice activity of pyrethrum stem extract in three different types of hair oil.

MATERIALS:

Chemicals: Pyrethrum, Ethanol, Coconut oil, And Olive oil, Castor oil Equipments: Measuring cylinder (10 ml), Beaker (250 ml), Dropper and Glass containers, Electronic weighing apparatus, Camera.

PROCEDURES:

EXTRACTION PROCEDURE:

The extraction procedure was done by using maceration methods. Dried forms of stem of pyrethrum were collected from herbal shop in Muscat and it was grinded as powder form. 153 grams of the pyrethrum powder was transferred to 250 ml beaker. The pyrethrum powder was soaked in ethanol for 6 days and shaken frequently. After 6 days the solution was filtered through filter paper by using vacuum. The filtered solution was taken in 250 ml beaker with known weight of empty beaker and allowed to evaporate in slightly warm water bath. After the complete evaporation of solvent ethanol, the extract was collected and the beaker was reweighed. The amount of Extract was 75 g.

PREPARATION OF HAIR OIL:

5 ml of each type of oil was measured and kept in glass containers.0.3% (15 mg) of the extract pyrethrum was added to each type of oil. The containers which containing the oil were placed in warm water bath to allow the extract to dissolve.

TESTS FOR ANTI-LICE ACTIVITY OF PYRETHRUM EXTRACT:

TEST #1:

This test was done to confirm the anti-lice activity of pyrethrum extract**.** The procedure was followed as per the reference of Vijayalakshmi et al [10].

A bunch of hair was taken. Each hair was coated with pyrethrum extract and standard marketed drug separately. In each coated hair few lice were put on and the time for lice to die was measured. The results were analyzed to confirm the anti-lice activity of pyrethrum extract.

TESTS FOR ANTI-LICE ACTIVITY OF PYRETHRUM EXTRACT IN COCONUT OIL, OLIVE OIL AND CASTOR OIL:

TEST #2:

This test was done to see which oil has better anti-lice activity. This test was carried out at normal room temperature and atmospheric pressure. Adult lice were collected and placed in a container containing human hair. The mouth was covered with a piece of cloth to permit ventilation. 5 lice were placed in a different plastic container. Each hair was soaked separately in the coconut oil, olive oil and castor oil containing pyrethrum extract as well as the standard marketed product of anise oil and kept inside the respective containers. The mortality was observed at every 30 minutes for each type of oil.

TEST #3:

The abovementioned procedure was repeated with coconut oil contains 1% (50mg) pyrethrum extract concentration.

RESULT:

Sr. No.	Lice Released	Test drug	Time
1	N=3	Pyrethrum Extract (stem)	24 minutes
2	N=3	Standard drug (Anise Oil)	90 minutes

Table No: 1 (for anti-lice activity of pyrethrum extract)

Sr. No.	Lice Released	Test Drug	% of mortality 30 min	% of mortality 60 min	% of mortality 90 min
1	N = 5	Pyr.Ext.+ coconut oil	60	60	100
2	N = 5	Pyr.Ext.+ olive oil	40	40	60
3	N = 5	Pyr.Ext.+ castor oil	20	20	80
4	N = 5	Standard marketed sample	40	40	40

Table No: 2(for anti-lice activity of pyrethrum extractin coconut oil, olive oil and castor oil (0.3% g/ml))
Pyr. Ext.: Pyrethrum Extract

Sr. No.	Lice Release	Test Drug	% of mortality 30 min	% of mortality 60 min
1	N = 6	Pyr.Ext.+ coconut oil	50	100

Table No: 3 (for anti-lice activity of pyrethrum extraction in coconut oil (1% g/ml))
Pyr.Ext.: Pyrethrum Extract

DISCUSSION:

From table #1,we found that pure form of pyrethrum stem extract can kill the three lice within 24 minutes. While standard drug (Anise oil) killed the three lice within 90 minutes. This indicates that pyrethrum extract has better anti lice activity than anise oil. From table #2, 0.3%(g/ml) concentration of pyrethrum extract was prepared and mixed with the three types of hair oil (coconut oil, olive oil and castor oil) and performed anti-lice activity, the mortality was observed for 30, 60 and 90 minutes. The result revealed that pyrethrum extract mixed with coconut oil show significant mortality. Based on the literature review it was found out that, the 0.3% concentration of pyrethrum flower extract in marketed shampoo products (example; R&C) proved that it has effective anti-lice property. So the same concentration of pyrethrum stem extract was used in this study to investigate the anti-lice property. From table #3, 1 %(g/ml) concentration of pyrethrum extract was prepared and mixed with coconut oil and performed anti-lice activity, the mortality was observed for 30 and 60 minutes. The result show that the more concentration of pyrethrum in coconut oil, the best anti-lice activity and faster mortality. Based on the literature review it was found out that, the 1% concentration of pyrethrum flower extract in the few marketed cream formulations (example; Nix) proved that it has effective anti-lice property. Hence the same concentration of pyrethrum stem extract was used in this study to investigate the anti-lice property.

CONCLUSION:

Head lice bites, especially in cases of huge infestations, may lead to enormous pruritus, skin inflammation, urticaria, exudations, lymph node swellings, eczema, scars, hair glue-up to “plicapolonica”, ending in pain and restlessness especially in children. All these symptoms are described as a disease called “pediculosis” which also includes psychological damages of infested children and their caring mothers. These effects occur since infestation with lice is often considered to have its origin in dirtiness of the infested persons and their families. In consideration of these physical and psychological consequences of an infestation with head lice, many countries made some anti-louse products prescribed by physicians. From the results we can conclude that the ethanolic extract of stem of pyrethrum in coconut oil has significant anti-lice activity. Advantages are inexpensive, less toxic and readily available. So we can conclude that the result revealed that pyrethrum extract has better anti lice activity than anise oil and also the result proved that coconut oil containing pyrethrum stem extract (0.3% and 1%) showed significant mortality of lice. We can suggest that stem extract of pyrethrum can also be used in herbal formulation as anti-lice agent.

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