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Efficacy and Safety of Apple Cider Vinegar in the treatment of Molluscum Contagiosum: a Randomized Placebo- Controlled Trial

Nesmarie Manalo Sacil*, Eileen R Morales and Armelia Andrea L Torres

Department of Dermatology, Ospital ng Maynila Medical Center, Philippines

ABSTRACT

Introduction: Molluscum Contagiosum is a common pox viridae infection among children. Although the condition is benign and self-limiting, treatment is warranted to prevent spread through auto-inoculation or close physical contact. To date no single treatment modality has been proven effective. Apple Cider Vinegar may be an alternative therapeutic option which can be used at home that is non-painful and effective.

Objectives: To determine the efficacy and safety of Apple Cider Vinegar in the treatment of Molluscum Contagiosum

Methods: The study is a randomized controlled clinical trial that was conducted at the Department of Dermatology of Ospital ng Maynila Medical Center using two types of topical treatment. Fourteen patients aged 2 to 18 who were clinically diagnosed with Molluscum Contagiosum were randomly allocated using sealed paper to apply Apple Cider Vinegar (n=8) or placebo (n=6) on the lesions twice daily for 6 weeks. The patients were blinded to the treatment allocation. Clinical parameters of resolution were noted at weeks 2, 4 and 6.

Results: Demographic characteristics showed no statistical difference ($p > 0.05$). The comparison of apple cider vinegar with the control group did not give any significant difference in resolution of lesions between the two groups at any time point. Erythema was noted by the experimental group which was statistically significant ($p = 0.04$)

Discussion: Apple cider showed promising results when half of the patients in the group showed inflammatory changes, with some of the lesions disappearing by the 4th and 6th week of administration. However, there was no statistical difference in the resolution of the lesions when compared to the placebo group.

*Corresponding author

Nesmarie Manalo Sacil, Department of Dermatology, Ospital ng Maynila Medical Center, Philippines. Tel: +639164699391.

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Introduction

Molluscum Contagiosum is a benign but nonetheless frequently troublesome viral infection among pediatric patients. It is a cutaneous and mucosal eruption caused by the MC Virus (MCV) of the Molluscipox genus of Poxviridae. There are 2 molecular subtypes of the virus, which is the MCV I and MCV II that result in clinically indistinguishable lesions. And although the proportion of infection caused by the subtypes may vary, MCV I cause the greatest number of infections.

Molluscum Contagiosum is a common self-limited condition in children. Children ages 2 to 11 are most often infected. It also occurs in adults usually as a sexually transmitted disease, and has been frequently observed in immunocompromised hosts, most notably among HIV infected individuals [1,2].

Transmission may occur via direct skin or mucous membrane contact, fomites or autoinoculation. Molluscum Contagiosum

frequently affects children using community swimming pools or siblings using the same washing sponges or towels [3].

Molluscum Contagiosum typically presents as small, firm pearly white dome shaped papules with central umbilication. Sizes may vary from 1 to 10 mm or more, with an average of 3-5 mm. The incubation period typically lasts between 2 to 7 weeks. Lesions can occur anywhere on the skin but is more common on the skin folds, lateral trunk, buttocks and thighs; with the number varying from a few to more than a hundred. Genital lesions can occur in 10% of childhood cases. Meanwhile in adults, it is frequently a sexually transmitted disease thus lesions favor the lower abdomen, upper thighs and penile shaft in men, and there are usually fewer than 20 in number. Diagnosis of molluscum contagiosum is typically apparent and is based on its clinical appearance [4].

In young immunocompetent patients, spontaneous resolution can occur with individual lesions lasting 2-4 months each; and duration of infection lasting an average of 18 months. Some authors give a range of clearance from 6 months to 5 years. However, since it is highly contagious, new lesions due to the incubating virus

may appear later. This is distressing to the parents and children causing feelings of embarrassment which may lead to school absenteeism and limited activities. Immunocompromised patients may not clear from the infection indefinitely owing to failure of achieving adequate immunity [5,6].

There are various treatment modalities available, which includes destructive methods, immunologic, antiviral, antifungal or cytotoxic in nature. Although there is considerable debate on whether treatment is necessary, it is still highly advisable in order to prevent spread through autoinoculation or close physical contact with family members and sexual partners. Existing treatment options are associated with substantial pain, tissue destruction, and frequent recurrences, however these are not tolerated well by patients due to pain and fear. Since the disease is self-limiting and generally resolves spontaneously, treatment should not be excessive or overly aggressive [7,8].

Apple Cider Vinegar is a type of vinegar made from the fermentation of apple or cider that has a pale to medium amber color. It is mainly used as salad dressing, vinagrette and food preservative. During the fermentation process the sugars from the apple are turned into alcohol which is in turn converted into vinegar by acetic acid forming bacteria. Its main component is acetic acid at a concentration of 5.14% with a pH of 3.075.

Acetic acid is one of the simplest carboxylic acids. It not only dissolves polar compounds such as inorganic salts and sugars, but also non-polar compounds such as oils and elements such as sulphur and iodine. It readily mixes with other polar and non-polar solvents such as water, chloroform and hexane. Vinegar is typically 4-18% acetic acid by mass.

Concentrated acetic acid is corrosive to the skin and may lead to burns. It is a strong eye, skin and mucous membrane irritant. Breathing vapours with high levels of acetic acid can cause irritation of the eyes, nose and throat. Chronic dermal exposure may lead to skin irritation and hyperkeratotic dermatitis [9].

With the aforementioned irritant property of acetic acid, apple cider vinegar which contains 5.14 % acetic acid could be a caustic agent that would lead to destruction of the molluscum contagiosum lesion by coagulation of proteins. This would induce local inflammation and subsequently result to resolution of molluscum contagiosum.

Significance of the Study

Molluscum contagiosum is a common infection among children that can pose a public health issue, with its spread among children rapid. Various therapeutic options are available but are either hospital based, induce pain and discomfort or require repeated sittings to achieve response. Thus at-home therapy is preferred by parents and children.

Apple Cider Vinegar may be a good therapeutic alternative if it is effective, easy to apply, can be self-administered with minimal adverse effects. To date there have been no published studies conducted to test the efficacy and safety on the use of Apple Cider Vinegar for the treatment of molluscum contagiosum, only various anecdotal evidence of its efficacy with its use at home. This study aims to provide a cheap, non-invasive, safe and readily available treatment for molluscum contagiosum.

Objectives

General Objective

To determine the efficacy and safety of daily topical application of Apple Cider Vinegar in treating Molluscum Contagiosum cases seen in Ospital ng Maynila Medical Center

Specific Objectives

1. To determine the socio-demographic profile of subjects using a questionnaire
2. To determine the efficacy of Apple Cider Vinegar in the treatment of Molluscum Contagiosum in terms of:
 - a. Reduction in number of molluscum contagiosum lesions in affected areas
 - b. Time lapse between treatment application and cure (resolution of lesions)
3. To determine the adverse effects of Apple Cider Vinegar in the treatment of Molluscum Contagiosum

Methods

Study Design

The study was a single blind randomized clinical trial using the application of topical Apple Cider Vinegar compared to a placebo-treated control group in the Department of Dermatology Out Patient Department of Ospital ng Maynila Medical Center.

Nature of Participants

Eligible subjects were all patients aged 2 to 18 years diagnosed with Molluscum Contagiosum by a thorough history and physical examination during a 6 months period. All participants were diagnosed for the first time at Ospital ng Maynila Medical Center, with no history of other pre-existing dermatologic diseases, no concomitant serious medical conditions and no history of application of any topical medications on the lesions for the past 1 month. The size of the lesion ranged from 0.2 to 0.8 cm, with no signs of inflammation or secondary bacterial infection. Excluded were patients with lesions on the genital area and who were immunocompromised.

Intervention

The socio-demographic profile of the subjects was obtained using a questionnaire. The efficacy and safety of Apple Cider Vinegar in the management of Molluscum Contagiosum, in terms of clinical resolution and adverse events, were noted by the physician and patient.

Parents or guardians of the patients included in the study were asked to fill out a consent form (Appendix A). The subjects were then assigned to another resident physician who did the random grouping of the participants by asking them to draw from a set of sealed papers labelled A or B which corresponded to the coded bottles. The allocation of treatment will be unknown to the subjects. The Apple Cider Vinegar and placebo were packaged in identical containers.

Baseline photography of the lesions was obtained prior to application of the solutions as well as on subsequent follow-ups. Parents or guardians were then asked to apply the solution to the affected areas two times daily after the patient's bath for six weeks. Subjects were instructed not to apply any other topical medications, and were asked to follow up at after 2nd 4th, and 6th week of application of treatment. Thorough history and physical examination were done during the follow-up visits to note for any adverse effects of the treatment.

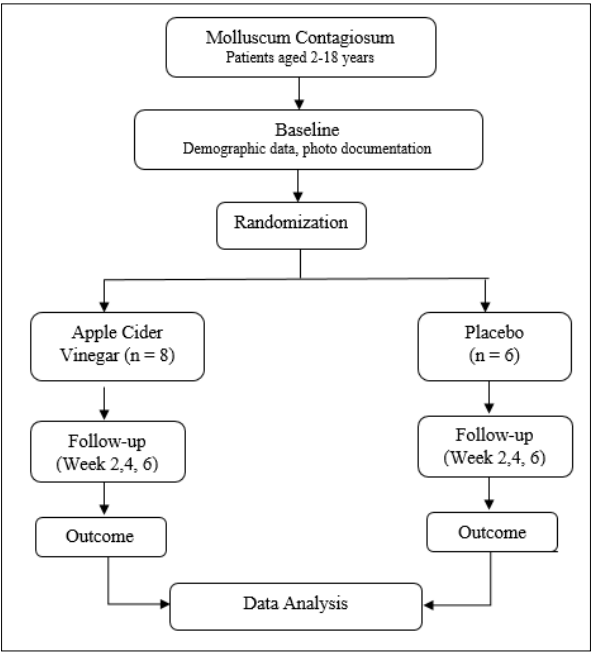


Figure 1: Assessment and treatment protocol for Molluscum Contagiosum patients enrolled in the clinical trial of Apple Cider Vinegar

Outcome Measures

The parameter used to determine the efficacy of the treatment will be based on the resolution or reduction in the total number of the lesions. Adverse reactions, such as development of secondary bacterial infection, pruritus, pain, dyspigmentation, and its time of onset were noted.

Sample Size

A total of fourteen patients were included in the study, eight for the Apple Cider Vinegar group and six for the placebo group. Post-ad hoc analysis showed the power to be at least 80%.

Ethical Concerns

This research protocol had been approved by the Institutional Review Board (Appendix B). A written informed consent was obtained from each participant prior to joining with the identity of the subjects concealed during photography. All adverse reactions were noted and treated accordingly. At the end of the study, all treatment failures received the standard of care free of charge.

Analysis of Data

Data were encoded and tallied in SPSS version 10 for Windows. Descriptive statistics were generated for all variables. For nominal data frequencies and percentages were computed. For numerical data, mean + SD were generated. Analysis of the different variables was done using student T-test for comparing two groups with numerical data. Chi-square test was used to compare or associate nominal data.

Results

A total of 14 subjects were included in the study. There were 8 subjects given Apple Cider Vinegar and 6 given placebo. Table 1 shows the comparison of age, gender and duration of the lesions between the two groups. The results showed that there was no significant difference noted as proven by all p values > 0.05.

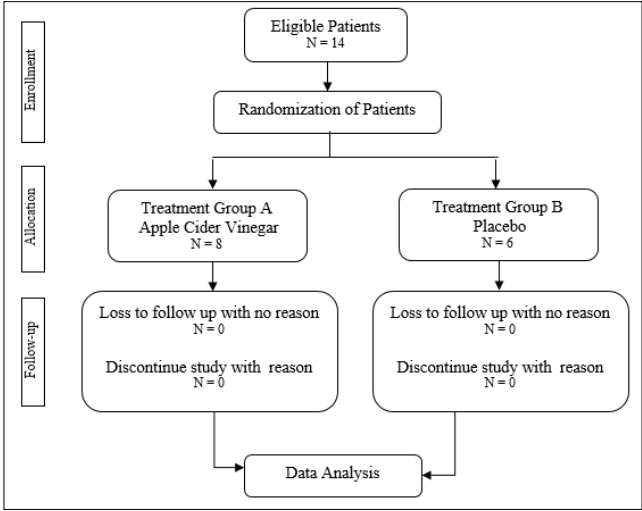


Figure 2: Flow diagram of Molluscum Contagiosum treated with either Apple Cider Vinegar or placebo

Table 1: Comparison of the Age, Gender and Duration of Lesion in Months between the two groups

Group	Age (Mean + SD)	Duration (Mean + SD)	Gender	
			Male	Female
Apple Cider (n=8)	6.12 + 3.48	5.88 + 4.02 Median: 4	7 (87.5%)	1 (12.5%)
Placebo (n=6)	6.50 + 2.88	7.00 + 4.98 Median: 7.5	3 (50%)	3 (50%)
p-value	> 0.05 (0.83)	> 0.05 (0.65)	> 0.05	

Exposure to a family member or close physical contact with someone who also has molluscum contagiosum is not a factor but there is a trend that patients given apple cider were exposed, or that the placebo group were not exposed. However, in both groups the difference was not statistically significant.

Table 2: Comparison on History of Exposure between the Two Groups

Group	Exposure	
	Yes	No
Apple Cider (n=8)	5 (62.5%)	3 (37.5%)
Placebo (n=6)	1 (16.7%)	5 (83.3%)
p-value	>0.05	

Signs of inflammation, such as erythema may precede before the complete resolution of lesions, thus a comparison in achieving a reaction was compared between the two groups. The results showed that there is a statistically significance between the two groups.

Table 3: Comparison of Presence of Erythema between the Two Groups

Group	Erythema	
	Yes	No
Apple Cider (n=8)	4 (50%)	4 (50%)
Placebo (n=6)	0	6 (100%)
p-value	0.04	

The primary outcome of the study was to note complete resolution of the lesion. 4 (50%) of the 8 patients in the Apple Cider Vinegar group noted a slight reduction in the total number of lesions by the 4th week of application. However, comparing the apple cider with the control group statistically did not give any significant difference in resolution of the lesions between the two groups at any time point (2 weeks, 4 weeks or 6 weeks)

Table 4: Comparison of the Percentage Resolution at Different Time Intervals

Group	Time of Treatment		
	2 weeks	4 weeks	6 weeks
Apple Cider (n=8)	0%	0.18 %	0.72%
Placebo (n= 6)	0%	0%	0%
p-value	0.7126	0.9096	0.4714

All patients who were noted to have erythema on the lesion in the Apple Cider Vinegar group reported associated localized mild pruritus, and only 1 patient from the placebo group experienced mild pruritus. 2 (25%) of the patients in the Apple Cider Vinegar group noted hyperpigmentation on the lesions that had resolved. None of the participants reported associated pain during the course of the clinical trial. Table 5 shows the comparison of the pruritus and dyspigmentation between the two groups. Statistical analysis shows no significant difference between the two groups, with regards to side effects.

Table 5: Comparison of the Pruritus and Adverse Events between the Two Groups

Group	Pruritus				Pain	Dyspigmentation
	mild	moderate	severe			
Apple Cider (n=8)	3 (37.5%)	1 (12.5%)	0	0	0	2 (25%)
Placebo (n=6)	1 (16.7%)	0	0	0	0	0
p-value	>0.05			>0.05		>0.05

Discussion

Molluscum Contagiosum is a benign self-limiting condition among the pediatric population. However there is no consensus regarding the most effective treatment for this dermatosis. Although waiting for the condition to resolve on its own is an option, many parents and patients prefer treatment that would remove the lesions directly or speed-up the resolution of the lesions. Treatment is often desired in order to prevent further spread to close contacts or through autoinoculation, development of secondary bacterial infection or possible scarring, cosmetic reasons and avoidance of the social stigma associated with visible lesions. The treatments are classified into destructive, immunomodulators and antivirals. Destructive treatments are the most commonly employed which can either be physical or chemical and are designed to remove or destroy infected tissues. Destructive treatments include mechanical removal by curettage, cryotherapy, and the application of keratolytic substances (salicylic acids and lactic acids, tretinoin) or vesicants (cantharidin). Curettage with mechanical removal of the umbilicated core of the MC-infected keratinocytes is the most commonly performed treatment. However, physical destructive therapy such as curettage may be frightening and traumatic for children as this is associated with much pain and

discomfort to the patient. Aside from pain and discomfort it can also cause psychological and emotional distress. Thus, among pediatric patients topical medication or chemical destruction is much favored. However, topical treatments presently utilized can either be unavailable in the Philippines or are relatively expensive. A search for a cheaper and relatively available chemical ablative therapy for Molluscum Contagiosum is very much in need. Several anecdotal home remedies for Molluscum Contagiosum includes apple cider vinegar, clove oil, tea tree oil, elderberry extract and iodine. In this study, apple cider was compared to placebo on whether or not it will have an effect on the resolution of Molluscum Contagiosum. In the study about half of the patients in the apple cider group showed erythema on the lesions which could be an inflammatory sign of possible resolution of the lesions. This was statistically significant compared with the placebo as no patient in the placebo group exhibited erythema on the lesions. In comparing the resolution of lesions between the two groups, a total of 5 lesions disappeared after 2 weeks of administration with apple cider with none of the lesions disappearing in the placebo group. Likewise on the 4th week of administration, 14 molluscum contagiosum resolved out of the total number of lesions in the apple cider group, with no lesions disappearing in the placebo group. By the 6th week of administration, a total of 3 molluscum contagiosum disappeared out of the total lesional count in the apple cider group with none disappearing in the placebo group. There was no significant difference among the two groups in relation to side-effects of pruritus, pain or dyspigmentation. With regards to resolution of lesions, there was no statistically significant difference between the two groups, which may be also be attributed to the small population size.

Conclusion

Although Apple Cider Vinegar showed resolution of some of the lesions and despite the varied anecdotal reports regarding its efficacy, this study has shown that Apple Cider Vinegar is ineffective for the treatment of Molluscum Contagiosum.

Recommendation

At this point, given the limitations of the study it is therefore suggested not to replace generally accepted treatment for Molluscum Contagiosum. However, with a much larger study population significant results may be elicited since apple cider vinegar did show resolution of some of the lesions. Another option that could be explored in future studies, of which have been described in previous anecdotes, is to utilize a different type of application of the apple cider vinegar such as placing wet gauze over the lesion and wrapping in elastic bandages or combining with duct tape occlusion.

References

1. Becker TM, Blount JH, Douglas J, Judson FN (1986) Trends in molluscum contagiosum in the United States, 1966- 1983. Sex Transm Dis 13: 88-92.
2. JL Bolognia, JJ Jorizzo, JV Schaffer, JP Callen, L Cerroni, et al. (2012) Dermatology. 3rd ed 1356.
3. R Romiti, AP Ribeiro, BM Grinblat, EA Rivitti, N Romiti (1999) Treatment of Molluscum Contagiosum with Potassium Hydroxide: A Clinical Approach in 35 Children. Pediatric Dermatol 16: 228-231.
4. Postlethwaite R (1970) Molluscum contagiosum. Arch Environ Health 21: 432-452.
5. William D James, Dirk M Elston, Timothy G Berger, George Clinton Andrews (2011) Andrews’ Diseases of the Skin Clinical Dermatology.11th ed 387-389.

6. Myskowski PL (1997) Molluscum contagiosum. New insights, new directions. Arch Dermatol 133: 1039-1041.
7. Sequiera FF (2008) Efficacy of Topical 10% Potassium Hydroxide in the Treatment of Molluscum Contagiosum 7: 1.
8. Rajouira EA, Amatya A, Karn D (2011) A Comparative Study of 5 % Potassium Hydroxide Solution Versus 0.05% Tretinoin Cream for Molluscum Contagiosum. Kathmandu Univ Med J 36: 291-294.
9. Proctor N, Hughes JP, Fischman ML (1988) Chemical Hazards of the Workplace. 2nd ed. JB Lipincott Co. PA <https://catalogue.nla.gov.au/catalog/1709805>.