

**Comparing Natural and Mainstream Medicines' Composition on a Molecular Level and
Effectiveness**

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Problem and Rationale

Currently, there are not many sources that compare the composition of natural and conventional medicines on the molecular level and their efficiencies. Studying this topic can benefit multiple fields or research and/or industries, including science, technology, society and even the environment. By studying this topic, science can be benefitted, as this information can be used to treat new diseases that may arise in the future or to treat current diseases more effectively. Similarly by publishing this information, patients would have access to information about different treatments and can have control over their decisions regarding their treatment. Society would also gain from this when dealing with illnesses such as the flu, or conditions such as acne. Hence we could use this information to find more effective treatments for these conditions and also reduce insecurities stemming from a lack of knowledge in society. Finally, research on this topic can benefit the environment as this could decrease the number of diseases found in animals, including those that can also be contracted by humans, and it could encourage people to protect medicinal plants, which are significant to society.

Method

Research methods consisted of reviewing scientific literature on the topic, including scientific papers and university, medical and government websites. The purpose of reviewing the literature was to study and compare the effects of honey vs. cough drops, and aloe vera vs. acne gel and their molecular interactions. Additionally, the purpose was also to compare different products and analyse the pros and cons of both natural and conventional medicine.

Research

I. Introduction and Definitions

The focus of this project was to compare the components and efficiency of natural medicines with mainstream medicines. Herbal medicine is defined as medicine that is made using natural ingredients and synthetic medicine is defined as medicine made in a lab. According to Karimi et al. (2015) around 100,000 people die in the United States every year due to side effects of synthetic medicine. On the other hand, hospitalizations due to herbal medicine are much more rare, although there are still risks such as contamination or pesticides that may be used on the plants. Additionally, Salmerón-Manzano et al. (2020) state that around 10% of all vascular plants (plants with a special vascular tissue) have medicinal properties, highlighting the importance of their preservation and protection. Finally, synthetic medicines can be based on herbal medicines. An example of this is aspirin, which is based on an ancient remedy (Montinari et al., 2018). This project also contains comparisons of two specific instances of herbal and synthetic medicines, namely for flu (primarily the treatment of cough), and acne.

II. Honey vs Cough Drops

For treatment for the cough and sore throats, the effectiveness of honey and cough drops were compared. According to Emmett Royal Honey (2022) and Ranneh et al. (2021) honey contains hydrogen peroxide, hydrogen peroxidase and Vitamin C, among many other ingredients. Hydrogen peroxidase is an enzyme that promotes honey's antimicrobial properties and hydrogen peroxide is an orally-taken antiseptic that reduces mucus and irritation in the mouth. Vitamin C is present in small amounts in honey but helps the body in fighting off illnesses. In addition, honey has a high sugar content and a low pH and, as biotic organisms only have a specific pH range, lowering the pH of the environment can undermine the bacteria. On the other hand, cough drops

contain menthol, hexylresorcinol, amylmetacresol, dichlorobenzyl alcohol or both amylmetacresol and dichlorobenzyl alcohol in some cases (Bunning, 2015). According to the same source, amylmetacresol and dichlorobenzyl alcohol have an effect on bacterial infections. Hexylresorcinol has a mild, safe anaesthetic effect that can create drowsiness. According to Bunning (2015), after throat lozenges or cough drops are taken, sodium channels are blocked and pain signals are not sent to the brain. This typically results in reduced cough or decreased throat pain. Menthol is another ingredient that is found in many, if not all, cough drops. It is added to help suppress cough and to soothe the throat. In *Halls Cherry Flavour Cough Drops*, the key ingredients were menthol, eucalyptus globulus essential oil, soy lecithin, glucose syrup and sucralose, with soy lecithin, glucose syrup and sucralose are non-medical ingredients (Halls, 2017). As stated before, menthol is a drug that is derived from the peppermint plant, although it is often made artificially in labs. Menthol provides a cooling sensation to the mouth and increases the amount of saliva produced by the mouth, providing relief from sore throats and cough (WebMD, n.d.). According to Mount Sinai (n.d.), eucalyptus globulus essential oil works as a cough suppressant and loosens mucus from the chest, making it easier to breathe and cough less. Soy lecithin is mainly added to cough drops to help all the other ingredients bind together and mix (Schaefer & Marengo, 2019). Glucose syrup is a liquid sweetener primarily used to make cough drops taste sweet and to extend shelf life, and sucralose is white sugar. Comparing honey and cough drops, there are advantages and disadvantages to both. In a study conducted by Goldman (2014), one spoon of honey per night was shown to be more effective than taking cough drops. However, some cough drops have been proven to be ineffective in combatting cough. One of the major, and likely the most severe side effects of honey, is an allergic reaction. On the other hand, there is more risk of side effects in cough drops as there can be contaminants

and unwanted byproducts of lab making present. Additionally, honey also benefits other parts of the body, such as improving gut health, while there are no other major benefits of cough drops. Additionally, a feature unique to honey is that consuming more honey can lead to less allergic sensitivity to pollens. On the contrary, honey takes a longer time to act on the body and an individual may have to eat quite a bit of honey for the desired effect. Cough drops are meant to provide quick relief from sore throats, making them more commonly preferred. Cough drops contain significant amounts of sugar to appeal to a younger audience (Junger, 2021) and people with diabetes or sugar problems are even advised against taking cough drops.

III. Aloe Vera vs Acne Gel

For the treatment of acne, the effectiveness of aloe vera and acne gel are compared. Acne is formed when a substance, called sebum, or dead skin, blocks hair follicles. According to Sánchez et al. (2022), the major components of aloe vera are aloesin, aloin, and emodin. All of these three compounds have been shown to have properties that protect the skin. In addition to these ingredients, aloe vera also has acemannan, aloe-emodin, and aloin, which have been shown to protect the skin by preventing inflammation. Acne gel contains ingredients such as benzoyl peroxide, tretinoin, azelaic acid, tetracycline and a few other ingredients (Brunning, 2022). Benzoyl peroxide kills the bacteria on the skin that is formed by the blockage by oxidising the bacteria. Tretinoin and azelaic acid have been shown to help reduce the blockage of the follicles by increasing the shedding of dead skin. Tetracycline is commonly used for severe acne and there are a few other ingredients called erythromycin and clindamycin which are used for mild acne. Tetracycline works in that it slows down the growth of the bacteria caused by the acne and also has anti-inflammatory properties, leading to a decrease in acne (Palmer, 2022). Finally, an ingredient called co-cyprindiol reduces the amount of sebum production and leads to less

blockage. In *CeraVe Acne Control Gel*, from Shah (n.d.), the listed key ingredients were ceramides, niacinamides, lactic acid, salicylic acid and glycolic acid. According to Kunde (n.d.), ceramides are used to keep the skin moisturised and prevent germs from entering the skin. Niacinamide's primary purpose is to maintain healthy cells in the body and is a type of Vitamin B3 (*NIACINAMIDE*, n.d.). Lactic acid is produced when the body breaks down carbohydrates and makes energy that the body can use (Cleveland Clinic, 2022). This benefits the skin as lactic acid removes dead skin cells and allows for new, better cells to grow in their place. Salicylic acid works as an exfoliant by removing dead skin cells, similar to lactic acid (*Salicylic Acid Topical*, n.d.). Finally, glycolic acid, the smallest-sized of the alpha-hydroxy acids, is used for better exfoliation of the skin and also has anti-aging effects, brightens the skin, removes dark spots and hydrates the skin (Palmer, 2022). When comparing aloe vera and acne gel and their effectiveness, multiple research studies have concluded and support the idea that aloe vera is one of the most effective acne treatments as it is an effective bacterial killer. However, while some acne gels have been shown to be effective, in some cases they may be less effective than aloe vera, and this can vary from person to person. Aloe vera also poses little to no risk in terms of side effects, as the major side effect is severe allergic reaction. On the contrary, a main concern with acne gel is the side effects as there are multiple chemical compositions and possible byproducts. Additionally, using aloe vera does not directly impact resistance to acne treatments, unlike acne gel, which the body can grow resistance to after frequent use. Aloe vera and acne gel both have their own advantages and disadvantages. For example, aloe vera has other benefits such as helping to heal sunburns, due to the different vitamins and compounds. However, the primary use of acne gel is to reduce acne and to revitalise and rejuvenate a person's skin. Aloe

vera can decrease the skin's ability to heal from wounds. Acne gel also can cause sunburns due to the tetracycline, which increases sensitivity to sunlight.

Conclusion

In conclusion, both conventional and herbal medicines are important to our society and have impacted society in many unique ways. Conventional medicines are quick to provide relief from various illnesses, such as the flu, although there are side effects present and can be ineffective over time. On the other hand, natural medicines have few side effects but take a longer time to act on the body or can require an individual to take the medicine multiple times. However, it is undoubtedly true that both types of medicines have their own role depending upon a patient's priorities.

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