# The Study Effects of *Quercus infectoria* on the Oral Environment in Gingivitis Patients

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## Abstract

Gingivitis is an inflammatory response of the gingival tissues to the metabolic products and pathogenic toxins of bacteria found in oral gingiva. Clinical indicators are redness, edema and swelling of the local gingival tissue.

Study comprised of 35 participants of age between 25-45 years who were clinically examined and divided into three group gingivitis of female, gingivitis of male and healthy control, These were classified according to the values of gingival index score.

*Q. infectoria* were applied topically to participants were suffering from gingivitis, In addition Strips of pH indicator paper were also used to diagnose the effect of *Q. infectoria* on the pH of the oral pathophysiology. Diagnoses and follow-up product were performed in a dental clinic under the supervision of a dentist by used gingival index for two weeks.

The progress of gingival measured in female group in terms of mean, standard deviation and variance were 0.7,0.135 and 0.018 before treatment while 0.3, 0.125 and 0.015 after treatment however for male group were 0.678, 0.189 and 0.03 before treatment while 0.291, 0.132 and 0.01 after treatment.

We observed the great efficacy of the herb product against gingivitis In addition, Significant changes in the PH of the mouth were also observed after using *Q. infectoria*, as it was found that PH value is close to neutral and within the normal range for all patients.

According to results were due to the fact that *Q. infectoria* contain large amounts of tannin and other compounds that constrict vessels and tissues and are effective as an anti-inflammatory for retention of gum tissue there for we recommend used for treatment.

***Keyword:*** *Gingivitis, Oral pathophysiology, Q. infectoria, Saliva, anti-inflammatory*

## Introduction

Oral mucosa essentially goes about as a barrier against the external harmful environments. Loss of its barrier function due to diseases or injury will cause significant dysfunction within the oral cavity[1].

The oral mucosa is the soft tissue covering of the oral hole, including the buccal mucosa and the gingivae . It has a wide range of different functions and consists of a distinct layered structure that is similar to the structure and function of skin[2].

Mechanical stress is continuously placed on the oral environment by activities and lead to sudden changes in temperature and pH meaning it must have the option to adjust to change rapidly . Because of these unique physiological features[3], One of the main functions of the oral mucosa is to physically protect the underlying tissues from the mechanical forces, organisms and toxins in the mouth[4] . Keratinised mucosa is tightly bind to the hard palate and gingivae. It represents 25% of all oral mucosa. It supports underlying tissues by resisting the loading forces exerted during mastication[5].

Due to its area at the passage of the stomach related and respiratory lots and its closeness to the teeth, the oral mucosa is exposed to various normal and man-made xenobiotics [6] . The peculiar architecture and absorption characteristics of the oral mucosa, particularly in areas of extreme thinness, coupled with the rich microorganism flora of the mouth, makes the oral mucosa exposed to many change in physiology tissue [7] .

Gum disease is the most widely recognized type of oral infection,, is characterized by inflammation of the soft tissue without evident clinical attachment loss. Studies on gingivitis have been conducted in many parts of the world with people of different ethnic and cultural backgrounds [8] .

The more extended that plaque and tartar remain on your teeth, the more they irritate the gingiva, the part of your gum around the base of your teeth, causing inflammation. In time, your gums become swollen and bleed easily. Tooth decay additionally may result. If not treated, gingivitis can advance to periodontitis and possible tooth loss [9] .

Within this pH scale of alkalinity and acidity, healthy saliva should generally be slightly acidic and fall between a 5.6 and a 7.9 when saliva exceeds or falls below this range, numerous health complications can occur. Consider that the body is mostly involved of water, which is a neutral substance. If the body drops too far out of the semi-neutral zone, which is approximately a pH level of 7.4, the whole chemical balance shifts and this is where problems can create .[10]

In the event that salvia is excessively acidic, which means it drops below 7.0 at that point it causes an oxygen-denied condition that expands the hazard for tooth demineralization, cavities and tooth decay. This risk increases because bacteria thrive in this type of environment. It is also important to note that foods containing sucrose, glucose, lactose, and starches provide food for the bacteria, allowing them to survive and reproduce [11]

Medicinal plants produce biologically active compounds and this is common in most compounds extracted from plants. *Q. infectoria* is one of the most widely used traditional medicines in Asia found in Cyprus, Syria, Turkey and Greece [12] .

*Q. infectoria* is a small tree with a height of about 2 meters The main constituents of the galls are gallic acid (2–4%), Gallo tannic acid (50–70%), ellagic acid, starch, and sugar Galls in traditional Indian medicine it was used as a toothpaste to treat gum disease and oral cavity [13] . It has also been used to treat internal bleeding, gonorrhea, tonsillitis and menstruation. It also possesses antibacterial, antiviral, pesticidal, fungal, and anti-inflammatory properties .

*Q. infectoria* is determined as a natural caustic which has antibacterial and antioxidants properties as well as containing several important bioactive compounds such as tannic acid, flavonoids, gallic acid, ellagic acid and others [14] . All of these bioactive constituents are scientifically demonstrated to give many benefits to human kind, particularly as far as pharmacological studies. Hence, due to this reason, a series of research has been conducted to recognize its beneficial effects in pharmaceuticals area [15] .

It has been used since ancient time to treat the inflammatory disease in oriental traditional medications. Additionally, pharmacology tests have demonstrated that the galls of *Q. infectoria* possess astringent, antitremorine, local anesthetic,antiviral, antibacterial and larvicidal [15] .

The aim of this study is to observe the physiological changes and pH of gingivitis patient by using the properties of Quercus infectoria that was used as a topical powder. And Can it be used as an alternative treatment instead of chemical drugs

## Materials and Method

**Sample Characteristic:** Thirty-five case (20 female and 15 male) examinations were performed by single dentist, who were calibrated to the exact procedures for disease diagnosis,

Clinical examination was performed by using periodontal probe and glass of mouth to obtain gingival index (Loe and Silness, 1963) and then analyzed data to see physiological change after using product .

The mean gingival index was used for the assessment of severity of gingival inflammation in the study sample. Slight gingivitis was defined as gingival index 0.1-1, moderate gingivitis as gingival index 1.1-2.0, and severe gingivitis as gingival index 2.1-3.0.

The effect of *Q. infectoria* on the pH of gingivitis has been diagnoses by used Strips of pH Indicator . saliva was collected for all participants, 5 ml were collected

from each one, and pH values were measured before and after using the product.

**Plant Materials:**

- The galls of *Q. infectoria* were purchased from the market and used as plant materials for this study
- The product was crushed to small pieces using a sterile pestle and mortar and powdered in an electric grinder.
- The powder was put in plastic containers .
- Patients were diagnosed by a specialist dentist and the cans were then delivered to each of them.
- The topical powder was used by the patient twice a day, in the morning and before bedtime.
- The patients were reviewed at the doctor's clinic after two weeks of using the products and the results were recorded by a personal physician.
- The LD50 was determined using the classical LD50 method of Behrens and Karbers (1953). No side effects have been reported for using this product in the various studies that have worked.

## Result

This is clinical study that showed the effect of galls of *Q. infectoria* extracts on people who have gingivitis . Thirty-five people participated in this study. Participants separated for three group G1,20 Female (Table1), G2,10 male (Table2) and G3,5 person as control. all of patient had Physiological problems in the gum tissue like dusky red, swollen, tender gums that bleed easily, especially when you brush your teeth.

The results were observed after using equal quantities of galls of *Q. infectoria* .It showed a significant ($p<0.05$) improvement in the decrease and regression of the inflamed oral tissues for both group.

The progress of gingivitis in group one before and after treatment were 0.7, 0.135, 0.018 and 0.3, 0.125, 0.015 for mean, standard deviation and variance respectively (Figure 1), while progress of gingivitis in group two before and after treatment were 0.678, 0.189,0.03 and 0.291, 0.132, 0.01 for mean, standard deviation and variance respectively (Figure 2).

On the other hand, the salivary pH in gingivitis was more acidic than the control group, pH is maintained near neutrality (6.7-7.3) by saliva In control group while gingivitis was (5.8 -6.8). the Result showed the average pH was $7.24 \pm 0.10$ after two weeks of using the product . This implies that the physiology of processes taking place within oral tissue is wide ranging and complex. Different levels of pH indicate different chemical environments which may imply that different disease.

**Table 1. Comparison of group of female gingivitis before and after treatment with *Q. infectoria***

| No | Age | Before | NO | After |
|---|---|---|---|---|
| 1 | 20 | 0.9 | 1 | 0.5 |
| 2 | 21 | 0.7 | 2 | 0.3 |
| 3 | 24 | 0.6 | 3 | 0.2 |
| 4 | 25 | 0.7 | 4 | 0.2 |
| 5 | 25 | 0.8 | 5 | 0.4 |
| 6 | 27 | 1 | 6 | 0.3 |
| 7 | 28 | 0.9 | 7 | 0.3 |
| 8 | 29 | 0.8 | 8 | 0.2 |
| 9 | 29 | 0.7 | 9 | 0.2 |
| 10 | 31 | 0.6 | 10 | 0.3 |
| 11 | 32 | 0.9 | 11 | 0.3 |
| 12 | 33 | 0.9 | 12 | 0.1 |
| 13 | 33 | 0.6 | 13 | 0.5 |
| 14 | 34 | 0.7 | 14 | 0.2 |
| 15 | 36 | 0.5 | 15 | 0.2 |
| 16 | 36 | 0.7 | 16 | 0.3 |
| 17 | 40 | 0.8 | 17 | 0.3 |
| 18 | 42 | 0.9 | 18 | 0.6 |
| 19 | 44 | 0.8 | 19 | 0.2 |
| 20 | 45 | 0.6 | 20 | 0.4 |

**Table 2. Comparison of group of male gingivitis before and after treatment with *Q. infectoria***

| No | Age | No | Before | After |
|---|---|---|---|---|
| 1 | 25 | 1 | 0.7 | 0.26 |
| 2 | 26 | 2 | 0.5 | 0.3 |
| 3 | 28 | 3 | 0.69 | 0.28 |
| 4 | 29 | 4 | 0.66 | 0.5 |
| 5 | 30 | 5 | 0.57 | 0.2 |
| 6 | 32 | 6 | 0.29 | 0.16 |
| 7 | 33 | 7 | 0.9 | 0.5 |
| 8 | 34 | 8 | 0.84 | 0.36 |
| 9 | 44 | 9 | 0.73 | 0.25 |
| 10 | 55 | 10 | 0.9 | 0.1 |

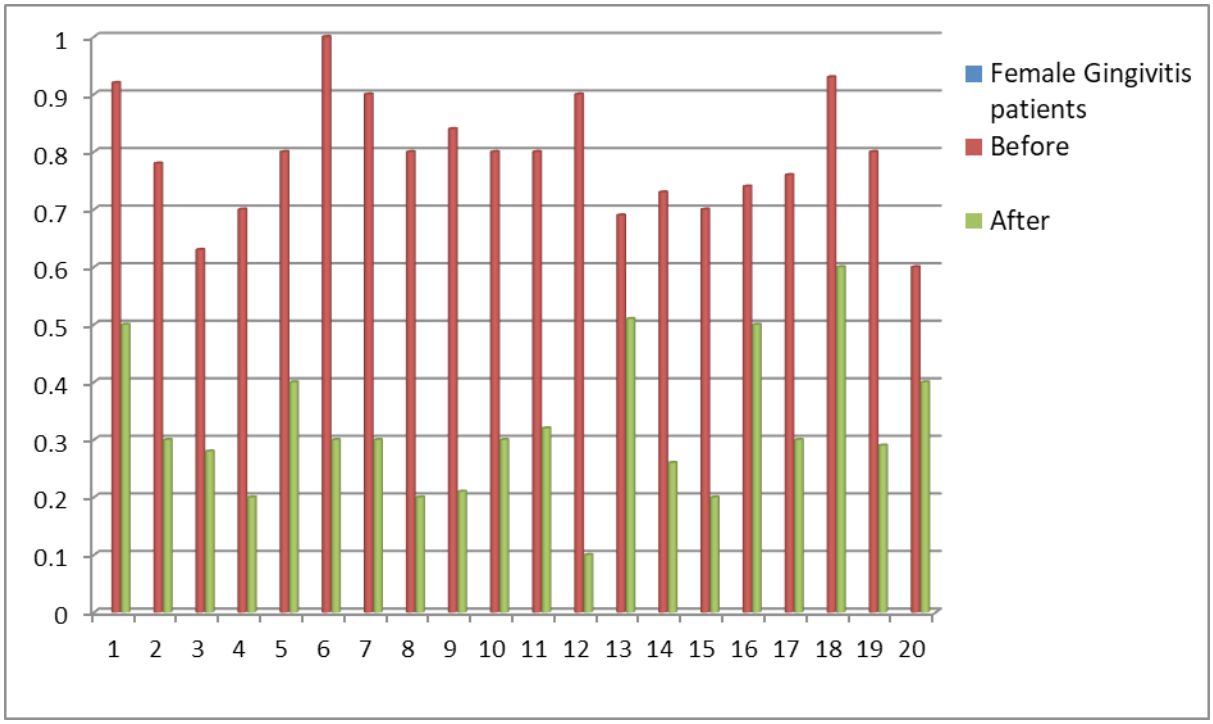


**Figure 1. Comparison of group of female gingivitis before and after treatment with *Q. infectoria***

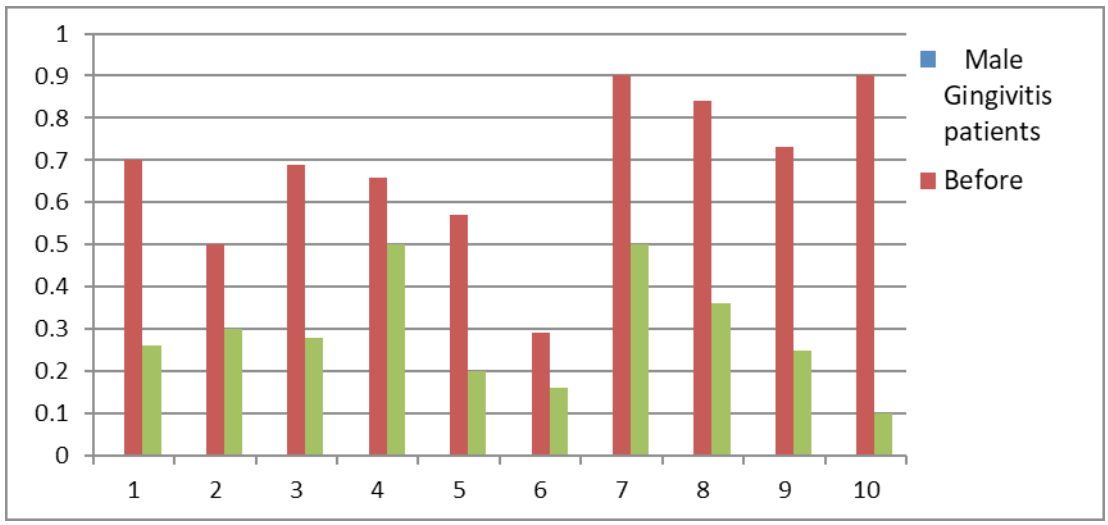


**Figure 2. Comparison of group of male gingivitis before and after treatment with *Q. infectoria***

## Discussion

This study has proved the high potential in oral physiology during using of galls of *Q. infectoria*, Pharmacologically the galls are claimed to have various biological activities such as astringent effect, anti inflammatory and antibacterial.

We show gingivitis patient have various symptom and manifest like moderate glazing, oedema, redness, and hypertrophy; bleeding on sensing but after two week of used product and According to the diagnosis and continuous careful study of each patient, the results proven high improvement in oral physiology,

Where a significant improvement in healthy gums function was observed, as the color of the gum tissue changed to pale pink while physiologic stippling of gum and tough have a limited sensibility to pain, temperature, and pressure. This improvement in gum tissue is due to *Quercus Infectoria* contain polyphenols which have great reducing power and serve as antioxidant.

An improvement in the oral tissues has also been observed for gingivitis patient suffering from severe inflammation this is due to one of the main reasons that cause gingivitis by infection of bacteria, fungi or viruses which make form plaque that can cling to the teeth which lead to irritate the gums, causing them to become inflamed. The inflamed gums bleed and swell. It is these bleeding and swollen gums that we recognize as gingivitis, Therefore, *Q. infectoria* have a great effect for treating gingivitis, due to their being a good antibacterial and antiviral.

The main constituents found in the galls of Q. infectoria are tannin (50-70%) and small amount of free gallic acid and ellagic acid there for possess pleiotropic therapeutic activities, with particular efficacy against inflammatory diseases,Different formulations can be made in form of gels, ointments, mouthinses and powder to be effectively used for the treatment of gingival diseases.

The resting pH of the oral cavity is between 5 and 9, it is also known to vary widely depending on a number of factors. A change in pH level was seen in severe gingival inflammation.

As the difference in the degree of pH of the mouth depends on the type of food, physiological processes and stress. also various Studies shown growth of microorganisms that effect on PH like P. gingivalis grows at a pH of 6.5-7.0, P. intermedia grows at a pH of 5.0-7.0 and F. nucleatum grows at a pH of 5.5-7.0. 5, 6.

The results showed a significant improvement in the acidity of the mouth and its transformation into neutral, as a result of the use of Q. infectoria, which regression and reduced gingivitis and removed the factors that lead to increased acidity in the mouth.

## Conclusion

These results shows a significant change after using herbal product in gingivitis patients, also the salivary pH shows improvement acidity in oral saliva .Therefore, we recommend using this Q. infectoria as an alternative treatments instead of drugs, as an improvement in oral and gum function has been observed without any side effect.

**Conflict of Interests:** Nil.

**Ethical Clearance:** Take from density Centre in Al Muthanna University by approval ethical committee.

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