

# Enhancing Periodontal Health with Oral Irrigation Devices: A Review

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### ABSTRACT

Oral irrigation devices are mostly used for oral physiotherapy in homes & dental clinics all over the world. The broad perspective in the use of oral irrigation devices has been the possibility of injury to the sulcular epithelium & underlying tissue. The existing oral irrigation devices exerts immense pressure on the sulcular epithelium. The patient found the procedure pleasant & neither injuries nor staining were noted. The technique may be useful in patients whose interdental areas can't be assessed properly. This study focuses on reduction on plaque, gingival bleeding & may therefore, be an adjunct to normal oral hygiene.

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### Introduction

The body of evidence on the oral irrigators also called water flosser & dental water jet consistently has been shown to significantly reduce gingivitis bleeding on probing, and periodontal pathogens [1].

These oral health improvements have been demonstrated with the use of either water or an antimicrobial agent [1]. The evidence indicates the oral irrigators effectively remove biofilm and are more effective than dental floss when added to tooth brushing [1-5].

Biofilms are often affected by brushing techniques thereby preventing the development of dental caries. Whereas toothbrushes are inaccessible to inter- proximal areas of tooth. Therefore, supplementary aids such as interdental floss & brushes are introduced [6-8].

Plaque biofilm is seen as the starting point of periodontal disease [9,10].



**Figure 1:** Oral irrigator

### History

Dr. CD Matterson developed oral irrigator device for the 1st time in the year 1950. His main intention was to clean the teeth & gums, instead of hand syringes after every meal. Its directly attached to sink's faucet & have a mechanical valve to control water pressure [1,2].

In the 1960s, oral irrigators (OIs) were introduced to the public with the aim of removing soft debris and unattached plaque using a pulsating water stream [11].

### Invention of Water Flosser

C. D Matterson began working on his device named hydraulic dental syringe [1]. The device is designed in such a way that it is attached to faucet & then faucets water pressure is used in between gum line & tooth [1]. It is believed to be the 1st invention of water flossing, but didn't become a success at first [1,2].

### Invention of Water Pik

Until 1962, oral irrigators were not developed [1]. Another dentist, Dr. Gerald Moyer, he came up with an electric device which could pump water between gums and tooth to clean the debris deposited [1]. Then he took help from another dentist, named Dr. Thomas W. Bennet helped him providing financial backing [1]. On 146th attempt, they got prototype oral irrigator working, but it is produced pulsating flow of water, beside this, Moyer pushed & tested device on his parents, He received excellent positive feedback [1,2].



Figure 2: Water Pik

### Functions of Oral Irrigation Devices

To remove dental plaque and food debris between teeth and below the gum line [1]. Improves gingival health, more effective at reducing bleeding on probing than flossing [1]. Reduction of inflammation, strong antimicrobial action against a broad spectrum of microbes, Dissolution of pulp tissue remnants, inactivation of bacterial virulence factors such as endotoxins [1,2].

In comparison to toothbrushes and the majority of interdental cleaning aids, the water stream produced by an oral irrigator can penetrate deeply below the gingival margin.

### Goals of Oral Irrigation Devices

oral irrigation devices, which operate by directing a pressurized water stream onto tooth surfaces, potentially have the ability to remove the dental biofilm above and below the gumline [12,13]. Lesser chances of periodontal diseases, preventing gingivitis [1].

Irrigation reduces friction between the instrument and dentine, improves the cutting effectiveness of the files, dissolves tissue, and cools the file and tooth especially during the use of ultrasonic energy prevent calculus formation [1,4,6]. It provides easier cleaning for braces & dental implants.



Figure 3: Benefits of Irrigator

### Mechanism of Action of Irrigation

It occurs through direct application of a pulses stream of water or other solution. Studies have showed pulsation & pressure as critical components of an irrigation device, Pulsating devices are 3 times effective [1,6]. Pulsation provides compression & decompression phase that gives expedient clearing of bacteria from the pocket [1]. Home irrigation have demonstrated clinical efficiency done using a water flosser with 1200- 1400 pulsations per min [1].

This rate has shown to create 2 zones of hydrokinetic activity

- Impact zone in which the solution initially contacts

- Flushing zone in which the solution reaches into the sub gingival sulcus [1].

Home irrigation penetrates subgingivally with both a jet tip & a soft, site specific, sub gingival tip. The jet tip generally used for full mouth irrigation.

Supragingival irrigation is an irrigation with a tip placed above the gingival margin results in penetration of a solution into the sulcus to approximately 50%. Supragingival tips with soft tapered bristles are effective in increasing the removal of plaque [1]. This is known as subgingival irrigation. The subgingival tip is used at a specific site such as implants, deep pockets, furcation, or crown and bridge [1].

### Fluid Penetration Depth

- **Tooth Brush:** 1-2mm,
- **Rinsing:** 2mm,
- **Floss:** 3mm,
- **Dental Water Jet:** 6mm
- **Tooth Pick/Wooden Wedge, Interdental Brush:** Depends on the size of the embrasure [1].

### Techniques of Supragingival Irrigation

- Common home use irrigation tip, plastic nozzles with a 90-degree bend at the tip attached to a pump providing pulsating beads of water. Patients are instructed to aim the pulsating jet across the proximal papillae [1].
- The irrigator should be used for both the buccal & lingual surfaces
- Patients with gingival inflammation should start at low pressure then increase the speed accordingly [5].

### Techniques of Sub Gingival Irrigation

The soft rubber irrigator tip tends to reduce the pressure & flow of pulsating jet of water, it permits penetration to 70% of pocket depth. The irrigation tip should be gently inserted in pockets for furcation areas 3mm if possible, each pocket is supposed to be flushed for a few seconds [1].

### Other Techniques

- Negative pressure irrigation which is a method to bring irrigant to root canal not to perturb it [6].
- Laser activated irrigation depends on rapid heating of irrigants. Multisonic activation: It doesn't require any preparation of root canal for the irrigant to reach [3].

### Solutions used in Irrigation

Saline water, Antiseptic /antibacterial mouthwashes. Diluted solution of chlorhexidine can Be used with a water jet (0.04% & 0.06%) [1].

### Oral Irrigation Therapy

Non-surgical phase consists removal of plaque, controlling, scaling, chemical agents and root planning [1]. Systemic antibiotics are considering in drug therapy, which is necessary to suppress sub gingival periodontal pathogens [1].

### Effects of a Chemotherapeutic Agent Delivered by an Irrigation Device on Plaque

Chemotherapeutic agents delivered by an irrigation device would results in significant plaque reduction, decreased bacterial count, and gingival bleeding [1,14,15].

## Conclusion

Oral irrigation devices are effective and safe for patients, includes those who are in periodontal maintenance; and those with orthodontic appliances, crown and bridge, implants [1]. Outcomes include decreased calculus, gingivitis, bleeding on probing depth, periodontal pathogens etc. Ultrasonic irrigation is more effective than syringe irrigation, henceforth their efficacy is not significant [7].

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