



**ORIGINAL RESEARCH PAPER**

**Dental Science**

**INNOVATION IN TOOTH BRUSHING – BLUE TOOTH TECHNOLOGY**

**KEY WORDS:** Plaque Control, Gingivitis, Electric tooth brush, Smart sensing, Oral hygiene.

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**ABSTRACT**

Tooth brush aids in maintaining the oral hygiene by cleaning the teeth, gums and tongue. Dental plaque is the primary causative factor of gingival and periodontal disease. Thus good oral hygiene by effective tooth brushing has a key role in the oral health. Mechanical plaque removal by tooth brushing are over-the-counter products that needs specific brushing technique by an individual to achieve plaque control. It remained undisputed until the discovery of electric tooth brush. Electric tooth brush are comfortable and they improved the efficacy of plaque control and gingivitis. They simulate the manual motion of tooth brush. The new era of smart sensing technology tooth brush is empowering dental professionals and patients to make positive and transformative changes to their oral health. Even an average individual will benefit from its use thereby improving the standard in maintaining oral hygiene. Henceforth overall health of an individual will also be protected.

**INTRODUCTION**

Dental plaque is the causative agent of the major dental diseases such as caries and periodontal disease<sup>(12)</sup>. Plaque as an etiologic agent was first identified in a classic study by Loe et al<sup>(6)</sup>. It was attributed to the shift to gram-negative plaque flora<sup>(5)</sup>, and it was noted that gingivitis was reversible when patients resumed their oral hygiene procedures. The use of preventive procedures to maintain optimal oral health is a major concern of the dental profession. Before the invention of the toothbrush a variety of oral hygiene measures had been used. This has been verified by excavations in which chew sticks, tree twigs, bird feathers, animal bones and porcupine quills were recovered. The first bristle toothbrush resembling the modern one was found in China. Used during Tang the Dynasty (619–907), it consisted of hog bristles. Mechanical tooth brush can cause potential harm to the tooth<sup>(1)</sup>. Later, Powered tooth brush invention was proved to be effective clinically. Commercial powered (electric) toothbrushes were first introduced in the early 1960s, although Frederick Wilhelm<sup>(11)</sup>, a Swedish clockmaker, patented the earliest device in 1855. Powered brushes were first introduced with a back and forth action. Subsequent development has lead to the development of rotary action brushes and more recently higher frequency of vibration brushes. Subsequent development has lead to the development of rotary action brushes and more recently higher frequency of vibration brushes. Now the new era in powered tooth brush with smart technology has begun, employing blue tooth to control the head of the brush. Thereby efficiently and precisely we can gain control by connecting to the phone and providing a real time feedback on how we brush.

**Mechanical plaque control**

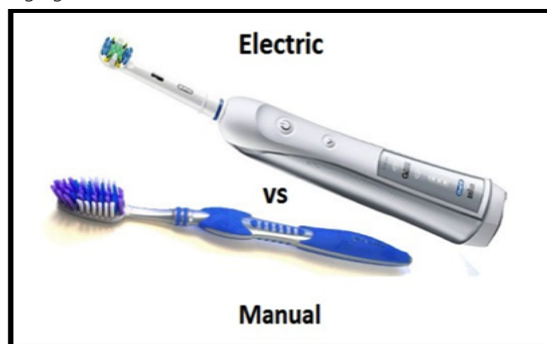
**Manual Tooth brush**

Mechanical plaque control is the removal of microbial plaque and the prevention of accumulation on the teeth and the adjacent gingival surface by the use of tooth brush and other mechanical aids. It controls the incidence of gingival and periodontal disease. Mechanical tooth brushing is the simple, daily method of maintaining oral hygiene in majority of the population<sup>(15)</sup>. The bristle tooth brush was discovered in China and later patented in America. It needs to be replaced every three months and need to employ the techniques precisely to remove the plaque. Wear of enamel and dentine can be dramatically increased if tooth brushing follows an erosive challenge. Gingival recession has a multifactorial etiology<sup>(8)</sup> and certain individuals and specific teeth may be predisposed to trauma from tooth brushing<sup>(7)</sup>. Tooth brushing is known to cause gingival abrasions but how these relate to gingival recession is not known<sup>(14)</sup>. Gingival recession most commonly exposes dentine and localises sites for dentine

hypersensitivity. Systematic reviews on the effectiveness of manual versus powered tooth brush on dental health proved that no other powered brush designs are superior to manual brushes<sup>(2)</sup>.

**Powered tooth brush**

Powered tooth brush was invented in 1939, Fredrick Tonberg, Swedish watchmaker in US made plaque control easier<sup>(17)</sup>. Powered toothbrush is recommended for disabled and hospitalized patients<sup>(4)</sup>. It has multi-directional power brush reduce the incidence of gingivitis and plaque, when compared to regular side-to-side brushing. An electric toothbrush performs rotations of its bristles and cleans hard to reach places. Most studies report performances equivalent to those of manual brushings, the powered brushing has significant decrease in plaque and gingivitis. An additional timer and pressure sensors can encourage a more efficient cleaning process. Studies comparing the plaque-removing efficacy between manual and powered toothbrushes has given contradictory results with few studies claiming superiority of powered toothbrushes over manual toothbrushes<sup>(16,13,3)</sup> While few studies found no such difference<sup>(9)</sup>. Electric toothbrushes can be classified, according to the speed of their movements as: standard power toothbrushes, sonic toothbrushes, or ultrasonic toothbrushes. Any electric toothbrush is technically a power toothbrush. If the motion of the toothbrush is sufficiently rapid to produce a hum in the audible frequency range (20 Hz to 20,000 Hz), it can be classified as a sonic toothbrush. Any electric toothbrush with movement faster than this limit can be classified as an ultrasonic toothbrush. Certain ultrasonic toothbrushes, such as the Megasonex and the Ultreo, have both sonic and ultrasonic movements. Studies have proved that powered tooth brush result in significant reduction of plaque and gingivitis<sup>(10)</sup>.



**Fig: Manual and Powered Toothbrush**

### Novelty in powered tooth brush

Challenging electric toothbrush implementing smart technology is the tooth brush with blue tooth technology. The Diamond clean smart electric tooth brush incorporates blue tooth technology to make our daily brushing even smarter<sup>(17)</sup>. With the help of smart sensor technology, this new age electric tooth brush provide data that help us to take better care of the gums and teeth. Once connected to the brushing app, we can have virtual image, whether we are brushing too hard or not, detected by a pressure sensor. Problem areas in our mouth, is indicated on a 3D mouth map, Missed spots when brushing, will be captured by the TouchUp feature. Location sensor will guide us to improve the brushing coverage. Even, we can reduce the scrubbing which will be tracked by the scrubbing sensor. This customized coaching is designed to lead to have better dental habits and healthier gums and teeth. Trials of longer duration are required to fully evaluate powered brushes. Data on the long-term benefits of powered toothbrushes would be valuable in their own right and could be used to trial other outcomes such as the adverse effects and benefits in the prevention of periodontitis and dental caries. Moreover, more trials would lend greater power to systematic reviews of the effectiveness of powered toothbrushes.

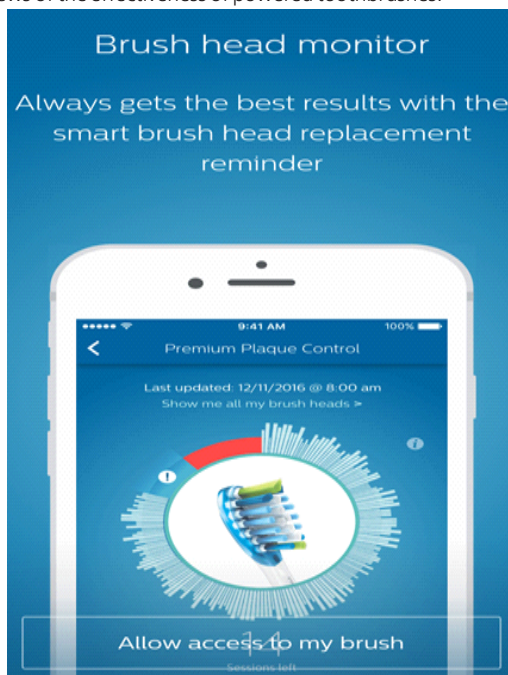


Fig2: Smart Brushing

### CONCLUSION

Trials of longer duration are required to fully evaluate powered brushes. Data on the long-term benefits of powered toothbrushes would be valuable in their own right and could be used to trial other outcomes such as the adverse effects and benefits in the prevention of periodontitis and dental caries. Powered tooth brushes achieve a better reduction of plaque and gingival bleeding scores. Individuals preferring powered tooth brush can be assured full control in handling the brush and effective removal of plaque, though there was not much statistical difference between powered and manual brushes. But, the powered brushes are safe. As no trial compared durability and reliability of using manual versus powered brushes, it is not possible to make clear recommendation of toothbrush superiority. Even though, considering cost of powered brushes, manual brushes may be the choice for our routine use. Still, it's the brilliant technology which we have to go in for achieving effective plaque control by an individual.

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