

## TEMPLATE FOR HISTORY OF PUBLIC HEALTH

# Evolution of toothbrushes throughout history

Pablo Alonso Lopez Beraun<sup>1,a</sup> | Viter Gerson Carlos Trinidad<sup>2,b</sup>

<sup>1</sup> Universidad de Huánuco, Huánuco, Peru.

<sup>2</sup> Universidad Privada del Norte, Trujillo, Peru.

<sup>a</sup> Master of Health Science with a specialization in Odonto-stomatology.

<sup>b</sup> Master of Science in Clinical Effectiveness with a specialization in Research and Management.

### Keywords:

oral hygiene; oral and dental hygiene products; toothbrushing; history of dentistry (Source: MeSH - NLM).

## ABSTRACT

The toothbrush has evolved significantly throughout history, starting with the use of chewing sticks or *miswak* in ancient civilizations such as Babylon, around 3500-3000 BC. These sticks, derived from plants like *Salvadora persica*, have been used to this day in various parts of the world, especially in regions with limited access to modern dental products. The transition to more complex tools occurred with the invention of the first toothbrushes with handles and bristles during the Tang Dynasty in China (618-907 AD). Over the centuries, the design and materials of toothbrushes were refined, notably with the work of William Addis in 1780, who created the first modern toothbrush with a bone handle and boar bristles. In the 20th century, advances in material technology, such as the introduction of nylon in 1938, replaced natural bristles with synthetic fibers that were more durable and easier to manufacture. Evolution continued with the development of electric toothbrushes in the 1930s, popularized in 1954, which facilitated their use for people with limited motor skills. Today, toothbrushes have incorporated features such as sustainability, increased effectiveness, and connectivity, marking the beginning of a new era in oral hygiene.

# Evolución de los cepillos dentales a lo largo de la historia

### Palabras clave:

higiene bucal; productos para la higiene dental y bucal; cepillado dental; historia de la odontología (Fuente: DeCS - BIREME).

## RESUMEN

El cepillo de dientes ha evolucionado notablemente a lo largo de la historia, comenzando con el uso de palillos de masticar o *miswak* en civilizaciones antiguas como Babilonia, alrededor del 3500-3000 a. C. Estos palillos, derivados de plantas como la *Salvadora persica*, han sido utilizados hasta la fecha en varias partes del mundo, especialmente en regiones con acceso limitado a productos dentales modernos. La transición hacia herramientas más complejas se dio con la invención de los primeros cepillos de dientes con mango y cerdas durante la dinastía Tang en China (618-907 d. C.). Con el paso de los siglos, el diseño y los materiales de los cepillos se perfeccionaron, destacándose el trabajo de William Addis en 1780, quien creó el primer cepillo moderno con un mango de hueso y cerdas de jabalí. En el siglo XX, los avances en la tecnología de materiales, como la introducción del nailon en 1938, sustituyeron las cerdas naturales por fibras sintéticas más duraderas y fáciles de fabricar. La evolución continuó con el desarrollo de cepillos eléctricos en la década de 1930 y su popularización en 1954, lo que facilitó su uso para personas con habilidades motoras limitadas. Hoy en día, los cepillos dentales han incorporado características como la sostenibilidad, mayor efectividad y conectividad, lo que marca el comienzo de una nueva era en la higiene bucal.

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### Correspondence:

Pablo Alonso Lopez Beraun  
 Lima, Perú

+51 968 261 446  
 pablo.lopez@udh.edu.pe



## INTRODUCTION

Among all dental devices developed for oral hygiene, none achieves as high a level of dental plaque removal as the toothbrush <sup>(1)</sup>, making it essential for eliminating one of the key risk factors in the development of caries and periodontal diseases <sup>(2,3)</sup>.

Throughout history, various civilizations have used a wide range of tools for oral hygiene, among which chewing sticks—known as *miswak*—stand out. This instrument, originating in Babylon around 3500–3000 BCE, is considered one of the earliest devices used for dental cleaning <sup>(4-7)</sup> and continues to be employed in many developing countries due to its accessibility, low cost, simplicity, and cultural and religious significance <sup>(8)</sup>. In addition, it offers multiple benefits, which have ensured its enduring use over time.

Today, the World Health Organization (WHO) promotes the use of chewing sticks made from *Salvadora persica* as an effective oral hygiene tool in regions where their use is common <sup>(9)</sup>. This plant, known as the “*miswak* tree,” is the most widely used among the nearly 182 species globally identified for this practice. Several studies have shown that chewing sticks made from *Salvadora persica* significantly contribute to improved oral hygiene, particularly in countries with financial constraints or limited access to dental healthcare services. Their clinical effects include antiplaque, antigingivitis, and anticariogenic properties, among others <sup>(8,9)</sup>.

The term *miswak*, of Arabic origin, meaning “tooth-cleaning stick,” has become closely associated with *Salvadora persica* due to its widespread use in dental hygiene practices. This plant has a broad geographic distribution, ranging from Rajasthan (India), Nepal, and Malaysia in the east, through Pakistan, Iran, Iraq, Saudi Arabia, and Egypt, to Mauritania in the west. In Africa, it is found in the northern region and extends through Sudan, Ethiopia, Central Africa, and into the southwestern part of the continent <sup>(8)</sup>. These sticks typically measure between 15 and 20 cm in length, with a diameter of 1 to 1.5 cm, and are harvested from the roots, branches, or bark of the *miswak* tree. To use them, one end is chewed until it frays, forming bristle-like fibers that serve to clean the teeth and gums. After several uses, the chewed end is cut off to expose a fresh section of the stick, and the process is repeated <sup>(10)</sup>.

### History and evolution of the toothbrush: from the Tang Dynasty to the modern era

Years later, the first brushes with handles and bristles were developed during the Tang Dynasty (618–907

CE). At that time, brushes were made using horsehair or boar bristles mounted on bone or bamboo handles. These tools were the forerunners of today's toothbrushes <sup>(7,11-13)</sup>, and they were used not only in imperial China but also in other Asian countries. Chinese literature from 1223 CE references horsehair toothbrushes used by monks to clean their teeth <sup>(4)</sup>, a model also documented by a Japanese Zen master during the same period <sup>(6)</sup>.

Later, during the 16th century, toothbrushes began to appear more commonly in Europe. Although historical examples are cited in France and other European countries, it was not until the 18th century that their use became integrated into the daily hygiene routines of many people <sup>(14)</sup>.

A major advancement occurred in 1780, when William Addis, while imprisoned in England, designed the first prototype of the modern toothbrush. It consisted of a bone handle into which holes were drilled, allowing boar bristles to be inserted and secured with wire <sup>(4,6,7,11-13,15)</sup>. Upon his release, Addis founded the company Wisdom Toothbrushes, which remains in operation to this day <sup>(4)</sup>.

In 1857, H. N. Wadsworth, in the United States, was awarded the first toothbrush patent <sup>(5-7)</sup>. The designs of that era featured handles made of bone, ivory, or wood, and bristles sourced from animals <sup>(7)</sup>.

The transition from natural to synthetic bristles took place in the 1930s and 1940s, mainly due to shortages of natural bristles caused by World War II. In this context, synthetic fibers such as nylon were introduced as a more durable and cost-effective alternative <sup>(15)</sup>. Nylon, the first synthetic fiber ever produced, was discovered in 1935 by a Harvard professor working at a research laboratory of the DuPont Corporation.

### Innovation and technology in the evolution of the toothbrush

Just three years later, in 1938, the first toothbrush with nylon bristles was introduced to the market. Nylon quickly became the most widely used material for bristles due to its numerous advantages over natural bristles <sup>(7)</sup>.

Toothbrushes became increasingly sophisticated with the emergence of electric toothbrushes in the 1930s <sup>(11)</sup>. In 1932, Clement Lieux patented the first battery-operated electric toothbrush, which featured a rotating head and interchangeable brushes <sup>(6)</sup>. However, it was not until 1954 that Swiss dentist Philippe-Guy Woog created the *Broxodent*®,

considered the first modern electric toothbrush, which marked the beginning of its widespread popularity <sup>(6,7,11)</sup>. This design was especially helpful for patients with limited motor skills and individuals wearing orthodontic appliances <sup>(7)</sup>.

From that point on, electric toothbrushes gradually improved. In 1955, General Electric introduced a cordless version with a rechargeable battery, providing greater convenience and flexibility for users <sup>(6)</sup>. In 1960, Squibb began marketing the *Broxodent* in the United States, and over the following decades, technological advances continued, including the introduction of wireless charging in 1961. In 1987, the first rotary-action electric toothbrush for home use was launched, and in the 1990s, toothbrushes with sonic action were developed <sup>(11)</sup>.

In recent years, technological advancements in the toothbrush industry have transformed both design and functionality. One of the most notable aspects of this evolution is sustainability, with the development of biodegradable toothbrushes aimed at reducing environmental impact. In addition, effectiveness has improved significantly, allowing modern brushes to provide deeper cleaning in less time, raising standards for oral hygiene. Connectivity has also become increasingly relevant, with the development of smart products that can connect to devices such as smartphones, enabling users to track their brushing habits, receive personalized recommendations, and access data on their oral health. In the 21st century, technological integration is significantly enhancing toothbrush functionality, offering measurable benefits to end users <sup>(16)</sup>.

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**PALB:** Conceptualization and design of the article, drafting of the manuscript, and approval of the final version.

**VGCT:** Critical revision of the article and approval of the final version.

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The authors declare no conflicts of interest.