**In the name of God**

**A comparative study of the performance of wireless implantable**

**implants in the head and neck area**

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**Abstract :**

**Aim** : With the increase of the elderly population in societies and the emergence of diseases and disabilities, especially in the head and neck area such as eyes, ears and brain, the need for implantable devices with the ability to help in hearing, vision and strengthening brain signals is increasing. Implantable implants with small size, high power and transmission of electrical signals can help improve the function of these organs. The purpose of this study is to investigate implants implanted in the head and neck area with wireless power transmission (WPT) and compare them with conventional wires and measure their performance.

**Method & Materials**: In order to conduct this review, original articles in English language were collected from PubMed and Google Scholar databases. Articles were reviewed from 1993 to 2023. Unpublished studies and studies in non-English language were not reviewed. The review was done on all articles in which implants were placed in the head and neck area, including eyes, ears, and brain. In this study, the aim was to focus on the devices that had the ability to transmit power wirelessly, although the articles in which the power transmission was done conventionally or with wires were also discussed. Key words such as WPT, ear implant, eye and brain were used for the review. And the results were compared together.

**Results** : High power wireless implantable implants are used in the brain region to guide neuronal messages in areas with neuron destruction. In the eye area, these implants are divided into two categories: intraocular implants for intraocular pressure detection and glaucoma treatment, where the sensor is installed inside the eyeball and the external sensor is installed on the eyeglass frame. And the implants embedded in the retina, which by amplifying the signal in the healthy nerve cells under or on the retina, receive the light and image messages sent from the glasses and wirelessly send the messages to the brain. And finally, there are cochlear implants, which by amplifying and sending electrical signals, increase the stimulation of the auditory nerve and treat problems in conductive-neural deafness patients.

**Conclusion** : With the spread of various diseases and the increase in the age of the world's population, implantable implants can be very efficient, especially with a small size design, high power, signaling capability and proximity to the tissue in the head and neck area.

**Key words** :

implantable device - WPT - ear implant - eye implant - brain implant