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Visual perception related to head control

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Abstract

Visual perception interferes with the movement of the head, before the maturation of vision, related to the perception of image, place, space, and distance of objects. The present study aimed to detail the importance of this cognitive factor in the psychomotor development related to vision. The methodology used was a literature review, using the descriptors "visual perception", "head control", "postural control" and "sensory information" in the National Library of Medicine (PubMed), Scientific Electronic Library Online (SciELO) and CAPES Periodicals databases. From the data survey, it was evident that visual perception has a great influence on head motor control, and is related to the later development of visual cognitive skills. There is also the need for further research in the meantime, due to the scarce amount of material available.

Keyword: Head Control; Visual perception; Sensory information.

1. Introduction

Visual perception is a cognitive skill that consists in observing something and processing the information that occurs. This requires the development of this skill, which is also present in reading and graphic representation. It has to do with our ability to process events around us. Its practice can be a device to build cognitive tools to be developed throughout your life. This resource can be used to build knowledge through the skills of observation, comprehension and analysis. Computers receive a lot of informational data and create concepts by processing these elements, while in humans this is done by repeating the process of observation comprehension, and the analysis of all the information simultaneously[9].

The cognitive ability acquired through visual perception is built with experience and awareness of the visual world in front of attention that guides motor actions, which are dependent on cortical function and structure. This development is considerably rapid, at age 9 the perception of figures and the ability to perceive positions are developed, and it is when the condition becomes stable, at age 11-12 the development is equivalent to that of an adult. Visual-motor perception has functions with visual components such as position in space; figure-background; visual closeness and constancy of form, and with integrated motor components being visual-motor coordination; copying; spatial relation and visual-motor speed, these components being important in the development of cognitive school skills and activities of daily living such as reading, writing, bathing, eating, etc[8].

Visual perception is one of several components of postural control, directly related with head control and support. This is because posture is controlled by appropriate muscle contractions based on sensory information

to ensure the desired position. This sensory information comes from the visual, vestibular, and somatosensory systems and helps the central nervous system to coordinate gates. Each sensory system provides information with its own characteristics due to its unique frequencies and amplitudes that cause each class of receptors to function uniquely[4].

This study aims to conduct a literature review to explore and provide information about visual perception and its impact on head control in order to expand our network of information on the subject.

In view of this, descriptors "visual perception", "head control", "postural control" and "sensory information" were used in the databases of the National Library of Medicine (PubMed), Scientific Electronic Library Online (SciELO) and the CAPES Periodicals, the literature reviews used were articles, monographs, and other scientific publications to gather relevant references. The articles used were in English and Portuguese and focused on current texts approaching the theme "Visual perception and its relation with head control". A total of 89 scientific publications were found, and after reading the title 40 were discarded and 13 were discarded after reading the abstract for being dissociated from the theme, and 24 articles were selected for full reading and 9 articles and 1 book were selected to compose the present study.

2. Literary reference

2.1. Physiology

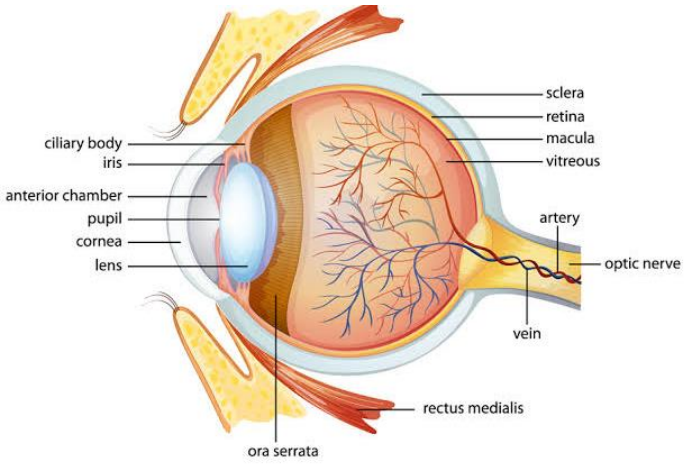
The optics of the eye correspond to those of an ordinary camera with a lens, variable aperture (pupil) and retina (film). The lens of the eye is composed of four refractive interfaces, the interface between the air and the anterior surface of the cornea; the interface between the posterior surface of the cornea and the aqueous humor; the interface between the aqueous humor and the anterior surface of the lens; and the interface between the posterior surface of the lens of the eye and the vitreous, each representing diopters. This is the surface that separates the two lenses and corresponds to a refractive optical system where light rays cross the lens interface when they strike it, and change direction, forming an image-point by refraction[2].

2.2. Sight Mechanics

Vision deals with the process from the passage of the image through the refractive system of the eye to the emergence of visual perception and the control that this perception has on human behavior. To detail the aspects of vision, it is possible to observe primarily that color perception is the distinction of space, the chromatic perception related to the colors of the surfaces of objects and about the systematization of this space into categories; as well as the perception of space and the perceived location, having visual control of action; whereas the perception of motion is associated with the depth of objects, based on primitive segregation and coercive mechanisms, which aims to specify the neurological mechanisms and the processing of movement, associated with the perception of motion and the link between perception and action. So visual perception can be described as the effect of binocular information for the perception of egocentric distances and for action control, such as locomotion near obstacles in near space[1].

2.3. Anatomy

The main structures of the eye are: The cornea is the transparent structure of the eye, consisting of a thin, tough membrane that protects the optics, transmits light and refracts it to the brain. The ciliary body contains a smooth muscle structure that contains the lens, and its function is to secrete aqueous humor, a clear fluid that nourishes tissues and helps maintain proper pressure inside the eyeball. The iris is the central structure that controls the entrance of light, with color variations (brown, blue, green, etc.); the retina is considered the main structure of the eyeball, sending signals through the optic nerve and its photoreceptors that process stimuli and allow the formation of images; the lens is located behind the iris, it acts as a natural lens and



remodels itself to make the image sharp[3].

Figure 1. Anatomical Structure of the Eye Globe.

2.4. Factors relating Perception and Motor Control

An important factor of visual perception is the parallax of movement, which consists in the apparent displacement of an object as a consequence of a movement of the observation point. In other words, when observing a body or object with the eyes completely immobile, there will be no perception of parallax if movement, so in order for it to be perceived, it is necessary to move the head bilaterally, causing the images of near objects to move quickly through the retinas, while the images of distant objects remain almost completely static. As if moving the head by 5 centimeters to the side, and with an object in front of the eye, its image will move almost all the way across the retinas, and an object 50 meters away has no perceptible movement. So, it may be possible to relatively assess the distance of objects[2].

The neuropsychomotor development is given by the acquisition of control over posture and movements, which are linked to the integrated development of the Central Nervous System in a gradual and sequential way. The first year of life is the evolution of the Nervous System, with the appearance and disappearance of some functions, such as reflex, which are evolved to complex and voluntary[6] movements. The important skills in the general motor development of the child is in the head, which from birth moves to feed itself. The head coordination related to visual perception is accentuated in the first four months of life, which contributes to the control of the anti-gravitational posture. As this head postural control develops in the child, visual

perception monitoring increases due to the contribution of coordinated movements, as well as the synchrony between object displacement and visual monitoring, thus allowing children to make the necessary adjustments to achieve new motor functions that require visual perception[5].

Visual perception directly influences head motor control by having a role in integrating sensory, visual, motor, and synaptic information, causing the mode of head tilt, position, and rotation to be chosen in the face of a given moment, behavior, and situation employed. Eyelid and brow control, through the activation of facial muscles, plays an important role in this situation by distinguishing the feelings conveyed at each occasion experienced, shaping social[7] perception characteristics. This function is diminished in patients with schizophrenia, since they have their psychosomatic and psychosocial functions diminished due to the reduction of visual integration caused by this pathology. Thus, we conclude that visual perception has a significant control on head movement arising from motor factors correlated to psychic aspects and to the integrated processing of visual resources[10].

3. Final Considerations

This study aimed at elucidating the importance of visual perception and its influence on head control. Thus, it was possible to understand that in order to have head-neck coordination, it is necessary the muscular-sensorial development, vision maturation, nociceptive and psychocognitive development integrally. The visual perception has a positive influence on head control, because it is in front of the sharp perception that is the development of essential movements, such as the perception of depth and distance that helps us to move around without the occurrence of mechanical incidents, since the visual perception related to head control depends on an interaction between the Neural System and the skeletal muscle, in front of the information that the Nervous System receives that makes it capable of balancing itself, as well as this success in controlling the posture depends on the sensory adaptation and strategies for maintaining balance. In view of the present study, it was evident the need to approach the theme for a better composition of the theoretical basis regarding the subject.

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