

An Anatomy of Human Brain and the Functions of the Various Regions of the Brain

BY: ISAAC K. DAMOAH (PhD)
Email: damoahisaac1974@gmail.com

ABSTRACT

The study adopted explanatory research design, qualitative research approach, cross-sectional survey as a research strategy, the population of was 10 authors, the source of data collection was primary source and the method of data collection was research. The study stated brief introduction of human's brain and the objectives of the study were achieved. The study considered authors who had published papers about the subject under study. The problem statement of the study was "An anatomy of human brain and the functions of the various regions of the brain". The study found out the components of human brain, the functions of the brain and the functions of the various regions of the brain, how to keep the brain healthy and the difference between humans' and animals' brains. The study generalized that Medical Doctors who had specialized in brain must creates platform to educate the general public to take measures to keep their brains healthy.

BACKGROUND OF THE STUDY

Introduction

The human brain is the largest and complex organ in the human body. The brain consists of specialized areas that work together and it is grouped into several lobes and surrounded by a layer of tissue known as meninges. The brain comprises of more than 100 nerves that communicate in trillions of connections called synapses (webmd,2021). The brain and the spinal cord make up the central nervous system.

OBJECTIVES OF THE STUDY

To find out the components of the brain

To find out functions of the brain and the functions of the various regions of the brain

To find out how to keep the brain healthy

To find out the difference between humans' and animals' brains

COMPOSITION OF THE BRAIN

The brain contains cells, nerve fibers, arteries, arterioles and fat. The brain is made up of 60 percent of fat but the brain of infants weighs 1 pound and increases to 3 pounds at adult stage. The cerebrum is the largest region of the brain which is 85 percent (healthline,2019). The combination of water, protein, carbohydrates and salt in the brain is 40 percent. The brain consists of neurons and glial cells (Hopkinsmedicine,n.d). Within the skull, the brain consists of cerebrum, cerebellum and brainstem. The peripheral nervous system is made up of spinal nerves and cranial nerves (mayfieldclinic,n.d).

THESIS STATEMENT: The problem statement of the study was "An anatomy of human brain and the functions of the various regions of the brain". The study found out the components of human brain, the functions of the brain and the functions of the various regions of the brain, how to keep the brain healthy and the difference between humans' and animals' brains.

FUNCTIONS OF THE BRAIN

- The brain controls thought, memory, emotion, touch, motor skills, vision, Breathing, temperature; hunger.
- The brain interprets information and embodies the relevance of the mind and soul.
- The brain is responsible for intelligence and creativity

- The brain receives information from the five senses such as smell, touch, taste and hearing
- The brain gathers information and store information in the memory
- The brain regulates blood pressure
- The brain releases hormones

Functions of the various regions of the brain

Cerebrum: The cerebrum consist of gray matter and white matter at it's center. The cerebrum is the largest region of the brain but initiates and coordinates movement and regulates temperature. The other areas of the cerebrum are responsible for speech, judgement, reasoning, problem-solving, emotion and learning (Hopkinsmedicine,n.d) The cerebrum is divided into two hemispheres separated by a groove called the great longitudinal fissure. The corpus callosum links the two hemispheres which permit the brain to send messages from one side to the other. The cerebrum's hemispheres are divided into broad regions known as lobes. The largest of the lobes are frontal lobe but the frontal lobes are found in the front part of the brain. The frontal lobes are responsible for high-level behavior like motor skills, problem-solving, judgement, planning, attention, emotions, personality and temper. Behind the frontal lobes are parietal lobes which are responsible for interpreting senory information from one part of the brain. The temporal lobes hold auditory cortex. These are found on either side of the head on the same position as the ears. Their functions are hearing, visual memory, verbal memory, interpretation of emotions and the reactions of other people. In the back of the brain is the occipital lobes and they enhance reading, recognizes colors and shapes (healthline,2021).

Cerebellum: The word "cerebellum" from Latin origin means "little brain". The cerebellum is the main structure of the hindbrain which is near the brain stem. The cerebellum coordinates voluntary movement and responsible for mortor-skills such as balance, coordination and posture. The largest structure of the hindbrain is cerebellum and it is located in the back portion of the skull below the temporal and occipital lobes and behind the brain stem. The cerebellum looks like small structure separated from the brain beneath the hemisphere of the cerebral cortex. The cerebellum is made up of cortex covering white matter and ventricle fill with fluid but divided into two hemispheres. The two main parts of cerebellum are cerebellar cortex and cerebellar nuclei. The cerebellar cortex is a layer comprising of folded tissue which contains cerebellum's neurons. The cerebellar nuclei is the innermost part of the cerebellum consisting of nerve cells that communicate information from the cerebellum. The cerebellum is 10 percent of the total volume of the brain but it is made up of 50 percent to 80 percent of the brain neurons (verywellfamily,2020).

Brain stem: The brain stem is the inferior part of the brain which links with the brain and the spinal cord. The brain stem develops into cranial nerves but it is the most vital part of the brain. The brain stem is made up of medulla oblongata, midbrain and pons. The medulla oblongata is the lower part of the brain stem and connects with the spinal cord; the upper part of medulla oblongata links with pons. The medulla is responsible for cardiac, respiratory, vomiting and vasomotor centers that controls heart rate, breathing and blood pressure. The midbrain controls vision, hearing, mortor control, sleep and wake cycles, alertness and temperature. The pons lies between the medulla oblongata and the midbrain. It consists of tracts that Carry's signals from the cerebrum to medulla and to the cerebellum. It has tracts that carrys sensory signals through thalamus (lumenlearning.n.d).

LITERATURE REVIEW

Many authors have written paers about human brain educating the general public with respect to the usefulness of the brain but the study is limited to an anatomy of human brain and the functions of the various regions of the brain. Because of this, the study investigated into what other writers had written concerning the topic under study. In 2021 Tanya Lewis and Ashley P.Taylor wrote an article entitled "Human brain: Facts, functions and anatomy" and said that the command center for human nervous system is the brain and receives signals from the organs of the body and send information to the muscles. The basic structure of human's brain and the brain of other Mammals are the same but large with respect to body size than the brains of a lot of mammals like dolphins, whales and elephants. The weight of human's brain is 1.4 kilograms and make up 2 percent of the weight of the body. The brains of males

is 10 percent bigger than females' brains. The volume of males' brain is 78 cubic inches and the brain's volume of females is 69 cubic inches. The gray matter of human's brain is 86 billion nerve cells. The human brain becomes triple in size at the first year of life and reaches maturity at the age of 25 years. In reference to (kids health,n.d) an article written entitled "Your brain and nervous system" states that the brain controls body even when we are asleep. The brain has five parts such as cerebrum, cerebellum, brain stem, pituitary gland and hypothalamus. The cerebrum is responsible for thinking and controls voluntary muscles and has two halves. The right half of the cerebrum controls the left side of the body and the left half controls the right side of the body. The right half of the cerebrum is responsible for abstract things like music, colors and shapes. It deals with math, logic and speech. The cerebellum is at the back of the brain below the cerebrum. It is responsible for balance, movement and coordination. It enables one to stand upright and move around. The brain stem is small but great and links the other parts of the brain to the spinal cord. It is responsible for breathing air, digesting food and circulating blood. The pituitary gland produces and releases hormones into the body. The hypothalamus is the thermostat in the brain and controls body temperature. With respect to the views of the above mentioned authors, the study found out the components of the brain, the functions of the brain and the functions of the various regions of the brain, how to keep the brain healthy and the difference between humans' and animals' brains brain.

BRAIN SIZE: The size of the brain is measured by weight, volume, skull volume and neuroimaging intelligence testing could be applied to study the volumetric measurements of the brain. The right cerebral hemisphere of man is bigger than the left but in size the cerebellar hemispheres are closer. Adult human brain weighs 1.5kg and the average weight of adult male is 1370g and adult female is 1200g. Adult male's brain volume is 1260cm³ and adult female brain volume is 1130 cm³. A study proves that adult human brain weight is 1,300-1,400g but newborn human is 350-400g (Wikipedia,n.d). Men have large brain than women but men's brain are approximately 100grams bigger than women's brain. With women parts of frontal lobe and limbic cortex and emotional regulation are larger than that of men. Parietal cortex and amygdala are larger than that of women. Human beings do not have the same brain size. Some have large brain size and others have small brain size (verywellmind,2020).

FACTS ABOUT THE BRAIN

- There is an evidence of successful brain surgeries during the Stone Age
- The brain consists of 75 percent of water. Dehydration negatively affect the functions of the brain
- Among all animals sperm whale has largest brain which weighs about 20 pounds
- During the first year of life, human brain grows three times in size
- Chemical reaction in the brain cause headaches combined with the muscles and nerves of the neck and head
- Human brain contains one hundred billion neurons
- Human use more than 10 percent of the brain when we sleep
- Information passes between neurons in the brain and neurons passes information at different speed. The fastest speed information passes between neurons is 250 mph
- Dreams are accepted as imagination, psychological factors and neurological factors
- The brain does not feel pain but interpretes pain signals
- After middle age, the human brain becomes smaller

HIPPOCAMPUS OF THE BRAIN: In the inner folds of the bottom middle part of the brain is the hippocampus. The word "hippocampus" is derived from the Greek words namely "hippo" meaning "horse" and "kampos" meaning "monster". The hippocampus is the sensitive part of the brain and responsible for learning and memory. The hippocampus is part of limbic system which responsible for feeling and reacting. The limbic system is found at the edge of the cortex including the hypothalamus and the amygdala. The hippocampus assists human to process and recall two types of information such as declarative memories and spatial memories (medicalnewstoday,2017).

MEMORY: Memory is the region of the brain where information is encoded, stored and retrieved when needed for influencing future action. Memory are stored in the hippocampus of the brain. The three major stages of memory are encoding, storage and retrieval. Problems could happen at any of the above mentioned stages. The three major

forms of memory storage are sensory memories, short-term memory and long-term memories. Sensory memory is stored unconsciously and permits individual to keep impressions of sensory information after the original stimulus has stopped. Short-term memory last for only brief time and can keep 7+/-2 pieces of information. Long-term memory keep large amount of information and last for very long time (lumenlearning,n.d).

HOW TO KEEP THE BRAIN HEALTHY

Exercise: Inactiveness is a major factor of getting dementia and exercise contributes to the health of the brain such as better stamina, strength, stress management and immune function. Movement as a form of exercise assists to reduce inflammation and stimulates the growth of neural cells.

Sleep: Getting enough time to sleep helps the brain to function well, able to learn and remember new knowledge.

Eat: An epidemiologist and founding member of Global Council On Brain Health in the person of Morris recommend that Mediterranean diet is Healthy for the brain like vegetables berries, beans whole grains, fish, poultry and olive oil.

HOW DOES OLD AGE AFFECT THE BRAIN

Old age brings many changes in human body which affect the brain. People who are old experience these changes in their brains:

- Some parts of the brain that deals with learning and other complex mental activities shrink
- In other parts of the brain communication between neurons are not effective
- Decrease of blood flow in the brain
- Inflammation increases
- Committing new knowledge into memory takes long time
- There is decrease in strategic memory which makes it difficult to recall names and numbers
- Frontal lobe and hippocampus responsible for cognitive functions and encoding new memories shrink
- The outer-ridge surface of the brain beomes thinned

DIFFERENCE BETWEEN HUMAN'S AND ANIMALS' BRAINS

Humans' brain

- Remarkable cognitive capacity
- Large cerebral cortex which is more than 80 percent of the brain mass
- Small olfactory bulb

Animals' brain

- less cognitive capacity
- Cerebral cortex is not large
- Large olfactory bulb
- Many of the animals have small brain size
- Glia to neuron ratio of a minke whale is 5.5 times larger than human

METHODOLOGY

Introduction

This chapter covers research design, research approach, research strategy, population of the study and the source of data collection and method of data collection. The study used explanatory research design because it was the best method of giving reasons for the data collected. The study used qualitative research approach since the study interested in an anatomy of human brain and the functions of the various regions of the brain. The research strategy used was cross-sectional survey in sense that the study research into papers published by journals and papers

published at the various websites. The population of the study, the source and the method of data collection were examined.

POPULATION OF THE STUDY

The study considered 10 authors as the population of the study.

THE SOURCE OF DATA COLLECTION AND THE METHOD OF DATA COLLECTION

The source of collecting data for the study was primary source and the method of data collection was research.

SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATION

SUMMARY OF FINDINGS

The study investigated into the components of human brain, the functions of the brain and the functions of the various regions of the brain, how to keep the brain healthy and the difference between humans'and animals' brains.

CONCLUSION

The study discovered that the brain defines the totality of man

RECOMMENDATION

Medical Doctors

Medical Doctors who have specialized in brain should create platform to educate the general public to take measures to keep their brains healthy.

Reference

- Santos-Longhurst,A.(2019, April 8),"What is the physical composition of the human brain",
[healthline.www.healthline.com](http://healthline.com)
- Anatomy of the brain,(n.d), [mayfieldclinic.www.mayfieldclinic.com](http://mayfieldclinic.com)
- Jili Seladi,S.(2021, November 22),"All about the brain: An atomy, conditions and keeping it healthy",
[healthline.www.healthline.com](http://healthline.com)
- Cherry,K.(2020,May 23),"What is cerebellum?",[verywellfamily.www.verywellmind.com](http://verywellfamily.com)
- The brain stem,(n.d), [lumenlearning.www.lumenlearning.com](http://lumenlearning.com)
- Wells,D.(2017, July 6),"Fun facts about the brain you didn't know", [healthline.www.healthline.com](http://healthline.com)
- Dreseden,D.(2017, December 7),"What is the hippocampus?"[medicalnewstoday.www.medicalnewstoday.com](http://medicalnewstoday.com)
- Five ways to keep your brain Healthy,(n.d),[eatergood.www.eater.berkeling.edu](http://eatergood.com)
- Nicols,H.(2020, September 9),"What happens to the brain as we age?",
[medicalnewstoday.www.medicalnewstoday.com](http://medicalnewstoday.com)
- Lewis,T.andTaylor,A.P(2021),"Human brain:facts, functions and anatomy",[livescience.www.livescience.com](http://livescience.com)