The efficiency of ginger capsules on IQ and serotonin concentration of male and female players

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Abstract: This study was carried out on 22 players, males (N=16) and females (N=6) ginger capsules ingestion (4g) was given to the participant for one month (30 days) so as to identify its influence on brain action, as IQ and serotonin concentration before and after the ingestion. Blood samples were with drawn from the participants, before and after ginger ingestion for one month at a dose of (4g) daily. IG test was done using (CPM) colored progressive matrices. It was composed of different figure to be completed (A_1 to A_5) and the results recorded as percent together with the duration of the test, serotonin concentration was also estimated using kit and Elisa techniques. The results revealed an increased percent of IQ and serotonin concentration in all participants males or females, together with different in the individual results due to individual variations. **In conclusion:** Ginger capsules affects positively different data of IQ and serotonin concentration, due to its components of vits, minerals, antioxidants and antibiotic effects and it preserve glucose of brain and glucose metabolism together with stimulation of CNS and brain action, also noted that individual variations between results due to different causes examples genetics of the players.
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1. Introduction and Problem of the Study

Physiologically, intelligence depend on the CNS, specially on the brain cortex, and the synapsis between brain cells denotes the brain standards due to their numbers.

Grander (1997) and Heshmat et al., (2004) reported the types of intelligence:

- Linguistic intelligence.

The power of communication.

- Logical Mathematical intelligence.

The power to use the number effectively.

- Spatial intelligence.

The power of remark and perceive the visual world places.

- Bodily kinesthetic intelligence.

The power to use the body and control its different parts.

- Musical intelligence.

The power to use the music to express.

- Interpersonal intelligence.

The power of respond actively with others.

- Existential intelligence.

Is the intelligence related to existence.

- Intrapersonal intelligence.

The power of know your self precisely.

- Natural untelligence.

Is the power of identify and to know the different creatures.

Bahi and Heshmat, (2002) in their book textbook of psychophysiology stated that ***Alfred Binet,*** the French Scientist, have made a model; of intelligence test to predict the ability of the child to succeed in the basic schools, and he discovered that the gifted child performs at a younger age compared with the less gifted child.

William Stern in year ***(1912)*** proposed intelligence quotient (IQ).

In the USA, ***Louis Troman*** at Stanford University, reported a new scale of (IQ) named Stanford Binet Intelligence Scale used until now.

Psychobiology (PB) is the branch of psychology studying the relationships existing between behaviour and the body, focusing its efforts mainly on the brain. For most students in psychology, however, movement has less appeal than other topics covered by PB, despite the great number of nervous areas implied in it, and the historical fact that the first notions on the functioning of the brain rise from the study of movement control ***(Garrot, 2003).***

Maria and Anna (2006) proposed that emotional intelligence is the ability to perceive and express emotions, to understand and use them and to manage them to foster personal growth, they added that they assume that people who are poor at dealing with emotions will have worse relationships, poor mental health, and less career success.

Neisser (1996) reported the intelligence known and unknown, in that IQ tests are deviated to some brains, and that the scientist of data analysis ***Spearman*** in ***1904*** stated that the child who perform good in one subject might also be good in other items in life, and that the different types of intelligence are not undependent to each others, and have a high relationship to each others, spearman called that

"general intelligence" as "g", and the speed of achieving any subject denotes a relationship to the intelligence. Also, the intelligence tend to increase rapidly between the age of 6-18 years. But his IQ compared to his colleages do not change much.

Ginger (Zingiber Officinale Roscoe).

Ginger is a world known food plant which is equally reputed for its medical properties. It has been reported to have:

(1) Antioxidative properties,
(2) It strengthen the memory, and stimulate brain action,
(3) It increases iron and fat soluble vit ADEK,
(4) It is reputed to have a high calorie stimulation,
(5) It may act as vasodilator.
(6) It increase immunity and act as a biological antibiotic.
(7) It may help to different organs to get rid of some poison metals like aluminium.
(8) Ginger may reduces the severity and duration of chemotherapy induced nausea, emesis.
(9) Ginger may inhibit platelet aggregation.

- Also may be safe for nausea and vomiting of pregnancy.
- Motion sickness / sea sickness.
- Rheumatoid arthritis, osteoarthritis, joint and muscle pain.

A bebe (2002), Altman, Marcussen (2001), Arfeen et al., (1995), Bryer (2005), Wigler et al., (2003).

Baddely (2003); Blank et al., (2004) stated that hippocampi is so important in helping the brain to store new memories, as hippocampi are among the most important output pathways from the reward and punishment areas of the limbic system, which provide the background mood and motivations of the person, and drive the brain to remember those experiences and effect memory. So, hippocampi, help the memory which is turn help learning and intelligence.

Barrett et al., (2006) revealed that serotonin is found in relatively high concentrations in a number of areas in the brain. The serotonin containing neurons have their cell bodies in the midline raphe nuclei of the brain stem and project to portion of the hypothalamus, the limbic system, the neocortex and the spinal cord. They added that the highest amount of serotonin and dopamine in the different area of brain might be Amygdala, caudate nucleus, putamen, globus pallidus, thalamus, hypothalamus and substantia nigra.

Martin, (1997) added that serotonin transporter gene is located on chromosome 11, and that serotonin is related to intelligence ***(Manal, 2012),*** Also ***Matt Ridley, (2013)*** agree that serotonin content increased in case of leaders and directors and politicians and the rapid method to increases the concentration of serotonin is through the ingestion of tryptophan and serotonin is made of tryptophan to the brain is by secretion of insulin from the pancreas and the most rapid method to increase insulin secretion from the pancreas is to ingest cakes and carbohydrates, other functions related to serotonin are to minimize pain substance, also regulation of sleep, together with circadian rhythm also an excitatory role in the regulation of prolactin secretion. This information argued the researcher to try to identify the relation of ginger to intelligence.

The aim of the study was to reveal the Efficiency of ginger capsules on IQ and serotonin concentration of male and female players.

Hypothesis:

It is hypothesized that ginger capsules induce a significant positive influence on IQ and serotonin concentration in male and female players.

2. Materials and Methods

The researcher used the experimental method, pre-post measurement.

Twenty two male and female players, 16 male and 6 female participated to this research. All participants were asked to fill out their healthy history, they were free from contagious diseases, refraimed from any medication throughout the experiment, they give a written informed consent about their participation.

They were asked to fill a coloured progressive matrices and the answered recorded plus the duration of the test before and after ingestion of (4 gram) ginger daily for 30 days.

5 ml of blood sample was withdrawn after venipuncture before and after the experiment for serotonin determination tools and devices used:

- Syringes, cotton, alcohol, plasters.
- Test tubes, covers.
- Balance, ice, deep freezer.
- Coloured progressive matrices for IQ.
- Elisa technique and kit for determination of serotonin concentration.
- EDTA anticoagulant.

The recommended dose for ginger supplements (4g). The common forms ginger include fresh root, dried root tablets, capsules, liquid extract, tincture and tea.

http://www.nlm.nil.gov/medline plus/ drug info/ natural/ patient-ginger.html.

Ginger supplements should be avoided by individuals with a known allergy to ginger and other members of the zingineraceae.

CPM coloured progressive matrices by ***John Raven***.

Ibrahim Mostafa (2008) of the Islamic University gaza, Dep. of psychology, introduced CPM of John Raven in Arabic, the test appeared 1947 for the first time and corrected 1956, the all period for preparation and correction lasted for 30 years by John Raven, this test is cross-cultural one, can be practice in different

environments and cultures. This test is one to estimate the perception of the relationship of places of the person. This test is built on the theory of spearman of general factor.

Test Compositions:

It is composed of 3 groups, are :

(1) ***Group (A):*** The success depend on the ability of a person to continue a continuous type, at the end it is changed from one direction to two at the same time.

(2) ***Group (AB):*** The success depend on the ability of a person to perceive the disconnected shapes of a whole type depending on the place connection.

(3) ***Group (B):*** The success depend on the understanding of a person to the rule controlling the change in shape connected to the place or moral, this need that the person have a clear thinking.

Every group is composed of (12) Matrices, and each matrice is composed at its end of (6) small matrices, and the person to be tested must choose one matrice to complete the upper matrice the proceeded groups are graduated to improve thinking and as a training on the method of working.

This give a chance to measure the growing of the brain to reach a stage to use the ideal thinking as a method to reach conclusion, which is the stage of brain maturity, which degrade in elderly, this make that mean performance of an (8) years old child near the performance of on (80) years old person.

These cards were designed with different colours, so as to attract the attention of the person as long as possible instead of disturbing his attention to other things.

Instructions for the person to be examined:

* After writing his name in the answered paper, he must look on the figure (A1) which is underlined by (6) different shapes and take his time to choose one of them which is suitable to complete the figure and put a sign on it.
* Then, going to figure (A2) and complete this figure with the suitable piece underlined, and take his time and sign the suitable shape that complete the figure (A2).
* Then, repeat the test until shape (Figure A5) and put a sign on the suitable shape underline to complete the figure (A5).
* After the test, the examiner correct the trials by given (1) point to the correct answer and (0) for the wrong one.
* The result of the test take a grade of 100 which indicate his (IQ) and brain level and intelligence percent.

This measurement has a good trust and stability after many researches that uses it, that was between (0.62-0.91) other researches (0.44-0.99) and (0.55-0.82).

Statistical Analysis:

SPSS statistical mean was used:

1. Arithmatic mean.
2. Standard deviation.
3. T-test used to compare the result before and after ginger ingestion.
4. Level of significance was fixed at 5%, $p < 0.05$.

3. Result and Discussion

The data presented in table (3, 4) indicated an increased significantly of percent of results of IG after ginger ingestion compare to data before ginger, between the male and female players. The percent increase of males was a little bit higher than females, as for the duration of test, there was different duration for the test, but the higher the IQ percent, the lesser the time.

As for serotonin hormone (Table 3,4) indicated an increased concentration of serotonin after ginger ingestions compared to the data before the ginger ingestion.

The better results of IQ tests and the higher concentration of serotonin may be induced due to ginger ingestion and its content of vit. ADEK, minerals as iron, magnesium due to its vasodilation affect and its immunity increase, antioxidants effect, get rid of poison, inhibit platelets aggregation due to strengthen of the memory, and CNS and brain action all these different action may help the brain to be more active and the nerves and synapses having increase speedy stimulation leading to activation of brain and increase the intelligence, noted in IQ and serotonin concentration in Table (3, 4).

The difference of the grade and percentage of the results may be caused due to individual variations ***(Mohamed, Kamel et al., 2014; Bean 2002; Bliddal et al., 2000).***

Guyton and Hall (2006) reported that serotonin is secreted by nuclei that originate in the median raphe of the brain stem and project to many brain and spinal cord areas, especially to the dorsal horns of the spinal cord and to the hypothalamus. Serotonin act as an inhibitor of pain pathways in the cord, and an inhibitor in the higher regions of the nervous system is believed to help control the mood of the person, perhaps even to cause sleep.

Steinlein, (2004) presumed that serotonin system normally provide drive to the limbic areas of the brain to increase a person sense of well being to create happiness, contentment, good appetite, appropriate sex drive and psychomotor balance. He also added that pleasure and reward centers of the hypothalamus and surrounding areas receive large numbers of nerve endings from the serotonin system.

Heshmat et al., (2004) reported that there are individual variations between individuals in shape, sex, abilities, efficiencies, skillness. The individual variations in the brain abilities may help people to reach higher grade in wisdom, championship and leadership due to the difference in the brain abilities and efficiencies. There are many factors affecting the individual variations: Genetic factors, hormonal and biological factors, environmental factors, experience all these are important to determine the variation between individuals, in the physical skill performance and brain abilities and level of intelligence, sences and perception. They also added the main characteristic features of individual variations depend on the anthropometric measurements, physical measurements and brain measurements of intelligence, linguistic efficiencies and mathematic abilities, social and psychological ones.

About the factors affecting the extent of individual variations ***(Fathy, 2015; Heshmat et al., 2013; Heshmat and Abdel Kafi, 2010; Abdel Rahman Zaher, 2011)*** stated that there are some factors affecting the extent such as: (1) The age of individual and his experience and his personality, physical and brain performance all affect individual variations, (2) The nature of his feature such as in physical activity the extent is smaller than skillness which is related to creativity and gifting, Also the extent of exitation is bigger than the upper brain operations, (3) The experience and training also affect the extent of individual variations, together with (4) Sex between males and females, the extent is larger between males than females.

Matt Ridley, (2015) reported that IGF_2R gene found in the long arm of the chromosome 6 may be known as the intelligence gene, and there are already more than 10 genes affecting intelligence. Gene IFG_2R is a huge gene, composed of 7473 nucleic acid, and that gene related to the intelligence, and the persons having high IQ and more efficient in using glucose in the brain, also the persons having high IQ may use a high amount of glucose in their brain, he also added that those having high IQ have more symmetric body compared to those having low IQ which means that they have been subjected to less presses and stresses in their body development in the uterus or in their enfancy, also they had struggling stresses.

Brain training is one of the important things in brain development, there are training for brain stimulation, as for physical training, brain training must be regularly done. As the regular training of the brain is the key factor for brain development, and for improving brain activity. Brain training led to built brain strategy, increasing memory strength and led the brain to do new skillness rapidly, example of brain training is playing chess, complete the shapes, cross words, computer games all these may induce brain development. Also drawing complex shapes to increase vision and space, also you may train by drawing shapes with the right hand and register the duration and repeat the drawing with the left hand ***(Barret et al., 2010).***

Marta and Tomasz, (2006) stated that there are many definitions of learning. Information technology and cybernetics play a more and more significant role as the models which facilitate a systematic approach to varied learning by humans. According to psychologists, learning affect the behaviour of an individual in the process of individual experiences ***(Tomaszewski, 1995).***

As a result it provides the learner with effectiveness which is both the objective of learning and the criterion for evaluating this process. Each experience provide the learner with new information which in turn facilitates getting to know the surrounding world, and enable people to behave more effectively and in a more certain manner which is turn translates into a more effective, that is fast, permanent and thorough learning ***(Czabanski, 2000).***

Ganong, (2000) reported that higher functions of the nervous system include learning, memory together with other functions of the mind. Learning may be defined as the ability to alter behavior on the basis of experience and memory is the ability to recall past events at the conscious or unconscious level. He also added that learning and memory involve formation of new synaptic contacts in the nervous system. This is difficult to disprove, but it now seems likely that most if not all instances involve instead biochemical changes in existing pathways, which lead to facilitated or inhibited post synaptic responses.

Matt Ridley, (2013) reported an intelligent denoting gene on the chromosome 6, discovered by ***Robert Plomin*** tested on a number of children in USA, aged 11-14 years, there IQ was around 160, they have a specific genotype of the gene IGF_2R encoded on the chromosome 6, contain 7473 alphabetic, some researchers reported that those having a high IQ are more able to utilize glucose in there brain.

Haier, (1992) agree that intelligence in related to glucose metabolic rate. ***Chorney et al., (1998)*** reported a quantitative trait locus associated with cognitive ability in children.

Matt Ridley added also that the French scientist Alfred Binet stated that the purpose of the IQ tests, was not as a benefit for the gifted children, but to give attention to the children which are less gifted.

Heshmat, Bahi and Amin, (2004) stated that intelligence is what is tested by intelligent tests, they added that intelligence is the power that permit us to think in picture or figures and the redistribute the thinkings.

Heshmat and Abdel Kafi,(2010) concluded that

the sport leader must posses many characteristics included: to be patient, responsible, intelligent, and to be the brain thinker. They also added that the leader persons posses a higher concentration of serotonin in brain than the normal person. Also, serotonin report the case of the person and his relationship to his surrounding and reflex his self image. ***Chatterjea and Shinde, (2013)*** showed that the influence of serotonin affect the brain barrier of the blood, and the more the secretion of serotonin in the brain the more the person posses intelligence.

Guyton and hall, (2006) reported the mechanism of action of serotonin as serotonin is secreted in the brain, it induce a state of excitation to the synapses, and some receptors in the brain which stimulates adenylcyclase leading to formation of (CAMP) which stimulates protein kinase, leading to stimulation of the protein which open and close the gates of potassium in nervous centers, leading to passage or prevent potassium from passage, as increased potassium passage increase action potential of the nerve cells, increase the knowledge through nerve cells leading to refreshing the memory and increasing intelligence in the brain of the person.

From the foregoing discussion, it is included that ginger capsules induce a significant positive influence on IQ and serotonin concentration in male and female players indicating that the hypothesis has been realized.

Table (1): Basic characteristics features of the players

Variables	Females		Skewness	Males		Skewness
	M	SD		M	SD	
Age (y.)	20.1	4.6	0.36	21.2	5.8	0.75
Height (cm)	159.3	7.9	1.80	171.3	8.3	1.73
Weight (kg)	61.4	5.7	0.64	70.4	6.3	1.20

Skewness (±3) , (n) females = 6 , (n) males = 16

Table (2): Represent IG% duration of test, serotonin concentration before (CPM) test (n = 22)

Variables	Participants	
	M	SD
IG%	81.3	8.7
Duration of test (min.)	6.1	1.3
Serotonin (Pg/ml)	87.3	7.6

(n) = 22

Table (3): IG% duration of test, serotonin concentration after (CPM) test (ginger ingestion)

Variables	Participants	
	M	SD
IG%	96.8	6.6
Duration of test (min.)	4.2	1.5
Serotonin (Pg/ml)	126.8	8.4

Table (4): IG% duration of test, serotonin concentration before and after (CPM) test (ginger ingestion)

Variables	Before		After		T Test
	M	SD	M	SD	
IG%	81.3	8.7	96.8	6.6	S
Duration of test (min.)	6.1	1.3	4.2	1.5	S
Serotonin (Pg/ml)	87.3	7.6	126.8	8.4	S

$P < 0.05$

4. Conclusion

It may be concluded that : ginger capsules affects significantly IQ and serotonin, due to its content of different important elements as vitamins and minerals with antioxidant and antibiotic effects and the effect extent was related to individual variations of the players.

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