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Research Article

The Relationship between the Vitamin E and Intelligence Level among Islamic High School Students girls (Maymouna Bint Al-Harith High School as a Model

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Summary:

A study was conducted to determine the relationship between vitamin E and intelligence (academic achievement) for students of Islamic schools, where the students were divided into four groups according to their academic rates, as following:

G 1 excellent rate group.

G 2 very good rate group.

G3 good rate group.

G 4 medium rate group.

This research included the measurements of Some biochemical parameters which are: Vitamin E level, SOD activity, glutathione level, peroxy nitrite level, cholesterol level and triglyceride level). also BMI mass rate was measured. The results showed there was no significant differences at the level of significance ($P \leq 0.05$) between the vitamin E and intelligence, but there is a non - significant increase in the vitamin level as the higher the intelligence. There were no significant differences ($P \leq 0.05$) between the activity of the superoxide dismutase enzyme (SOD) and intelligence, but there is no significant increase in the level of the enzyme with the higher of the intelligence. There were no significant differences at the level of significance ($P \leq 0.05$) between glutathione and intelligence, but there was a non - significant decrease in the level of it with the higher of the intelligence. There is no significant differences ($P \leq 0.05$) between peroxy nitrite and intelligence, but there is non- significant increase in peroxy level as intelligence increases.

Also the results showed a significant differences (P≤ 0.05) between cholesterol and intelligence where there is a decrease in cholesterol level as the higher the intelligence. There were no significant differences (P≤ 0.05) between triglycerides and intelligence, but there was a non - significant decrease in the level of this lipid as the intelligence higher. There was no significant differences (P≤ 0.05) between the rate of body mass index and intelligence, but there is non- significant decrease in the level of BMI the higher the intelligence.

The correlation between vitamin E and biochemical data was found. The results showed that the relationship between vitamin E and (SOD) enzyme was positive in groups G1 and G4 while negative for groups G2 and G3. G4.

The results showed that the relationship between the level of vitamin E and the level of peroxy nitrite was positive in groups G1, G2 and G4 while negative in the group G3. The results showed that the relationship between vitamin and cholesterol was positive in groups G1 and G4 while it was negative for groups G2 and G3. The results showed that the relationship was positive between vitamin and body mass index in group G1, while the relationship was negative in groups G2, G3 and G4. The results showed that the relationship between vitamin E and intelligence was positive in all groups G1, G2, G3 and G4.

Introduction :

Vitamin E is a major lipid-soluble antioxidant in the cell's antioxidant system. (1) (2) Vitamin E protects polyunsaturated fatty acids and other components of cell membranes and low density lipoproteins from oxidation by free radicals. It is obtained exclusively from the diet. (1) Vitamin E was first discovered by Evans and Bishop in 1922, (3). Since then, vitamin E has been well described as a powerful lipid-soluble antioxidant through extensive research has been confirmed as effective as antioxidants and the results have confirmed its ability to scan reactive oxygen species (ROS) in cell membranes (4) (5) (6).

Sources of Vitamin E

Vitamin E consists of a mixture of tocopherols (TOCs) and and tocotrienols tocotrienols (TCTs), available in a number of foods and plants, ranging from edible oils to nuts.

Some foods containing vitamin E include wheat, rice bran, barley, oats, coconut and bran (7) (8). Other sources include walnuts, hazelnuts, poppies, corn, grape seeds and pumpkins. Vitamin E derivatives were also detected in breast milk (9) and dates (10). Among the many sources of vitamin E, rice bran, palm oil and coconut oil were described as the richest sources of TCTs (11).

Superoxide Dismutase (SOD)

Superoxide dismutase SOD, (EC 1.15.1.1) is an enzyme that alternately stimulates the dismantling (or splitting) of the oxide root (O2−) into any ordinary molecular oxygen (O2) or

hydrogen peroxide (H2O2). Superoxide is produced as a by-product of oxygen metabolism, and if not regulated, it causes many types of cell damage. (12) The most important function of this enzyme is to restore cell viability, reduce its speed of destruction and offset a type of free radicals called super oxide, perhaps the most dangerous (13).

Cholesterol

Cholesterol is a waxy substance found with other lipids in the bloodstream and in all cells of the body. About 80% of blood cholesterol is Cholesterol esters, whereas 20% is free cholesterol (16).

Triglycerides-TG

It is a form of fat found in the blood plasma and is a source of energy storage and transport, and consists of the glycerol esterification with three molecules of fatty acids (17), and triglycerides are the main compound in the daily dietary fatty substance, is a simple and abundant fat, which is stored Subcutaneously within the fatty tissue of the animal (18),

The current study aims to find out whether the (vitamin E) has a relationship with intelligence and its relationship to body mass index; since the role of vitamin E as an antioxidant and reduce the impact of fat in the body (19), where recent studies have been interested in the role of antioxidants in the prevention of oxidative stress that occurs in abnormal situations, as the body has several defensive mechanisms to control the production of free radicals, to determine their risks or to rebuild tissue damage.

Antioxidants have several mechanisms by which they can detoxify the body's harmful oxygen-mediated oxygen compounds, including breaking chain reactions such as glutathione, or acting as free radical sweepers such as the superoxide oxidase enzyme, which captures the root of superoxide and acts as chelating transition metals (20).

The study also aims

1. To know whether the level of vitamin E in the serum is related to the level of intelligence among students of Islamic schools
2. If there are statistically significant differences at the (0.05) level between the groups and the biochemical variables for vitamin E, the activity of the (SOD) enzyme, glutathione, peroxy nitrite, cholesterol, and triglycerides in female serum, and body mass index (BMI) in the excellence group, Very good, good, average.
3. There is a correlation between vitamin E and biochemical data in the sera of female students in the groups of the level of excellence, very good, good, and medium.

Material and Methods

Materials: High purity materials are used from international origins such as DBH, Fluka, Sigm.a

Blood samples collection

The samples were collected from Maimouna Bint Al-Harith Islamic High School students for girls in January 2019, where 42 samples were collected.

About 4-5 cm3 of blood was withdrawn intravenously, in single-use plastic test tubes and then the serum was separated by centrifuge at a speed of 2000 r / min for 10 min, and the serum was kept at -20 ° C until the time of Biochemical tests.

The following information was measured:

The body mass index (BMI) was measured in meters by the equation

Weight (kg) / Square Height (m^2) (21) (22)

The BMI ranging between normal to high the students girls who have BMI more than 25kg were (20 students), while the student have a normal BMI were 22.

Table (2-1)

GROUPS	BMI
normal	18.5-24.9 kg
obesity	More than 25 kg

The students were divided into groups according to the study rates where they were divided into four groups as in table (2-2))

Table (2-2)

The groups	The rats
G1 excellence	90-99%
G2 very good	80-89%
G3good	70-79%
G4 moderate (average)	60-69%

Fasting samples were taken for the measurement of triglycerides and cholesterol, the measurement of vitamin E, the evaluation of the superoxide dismutase (SOD) activity, glutathione and the peroxy nitrite.

Vitamin E was measured in serum. This method was based on the reaction of Emmerie - Engel (23). The serum peroxy nitrite was also estimated using Modified photochemical Nitroblue Tetrazolum (NBT) method of the Vanuffelen et al (26).

Kits were used to measure other biochemical data according to the method supplied with the ready kits. (30) (31).

Statistical analysis:

The results were statistically analyzed using ANOVA and Minitab. The mean averages were determined to determine the differences using Duncun's Multiple Range test with a probability level ($P \leq 0.05$).

Results and Discussion

1. **The level of vitamin E activity in the blood serum:**

Effectiveness levels of vitamin E in the serum of female students were measured. Table (4-1) shows that the mean ± standard deviation of the vitamin was (1.33 ± 0.55) units / l for the excellence group and (1.25 ± 0.109) units / l in the serum of the group was very good rats, while, (1.005 ± 0319) units / L and (1.10 ± 0.08) units / l in serum of the two groups good and average as in Figure (4-1).

Vitamin E have non-significant increases as the level of education increase, and this indicates that the vitamin is affected by the level of education and this is what we wanted to prove that vitamin E changes and increases with the increase in the level education. The literature did not indicate that the level of education linked to vitamin E, but most research indicates the role of vitamin E is to reduce the incidence of Alzheimer's. Brodaty et al. have proven that the vitamin E has a protective role against Alzheimer's disease, reduces its symptoms and reduces brain damage and has an antioxidant effect.

Table (4-1) mean ± Standard Deviation of Vitamin E Level, (SOD) enzyme activity, glutathione, Peroxy Nitrite in Female Serum in Academic Level Groups Excellence, Very Good, Good, Medium.

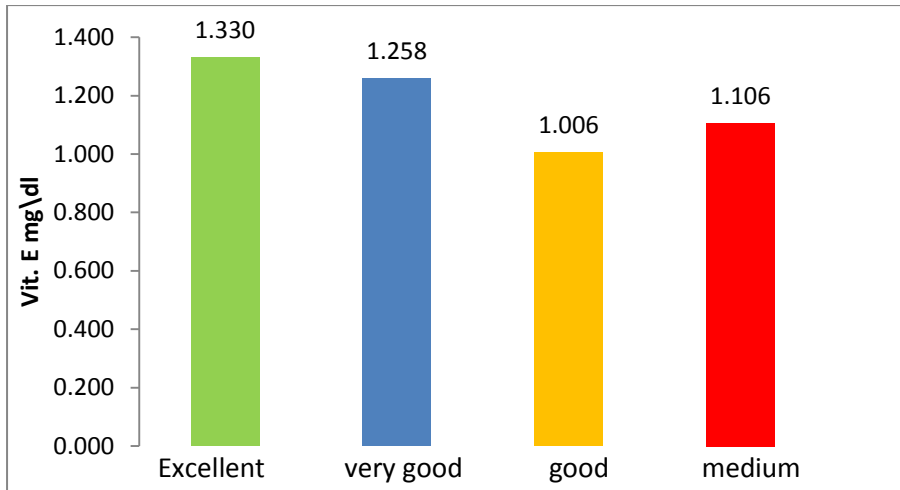| groups	Vit. E	SOD	Glutathione	peroxy nitrite
G1 excellence	1.33 ±0.55	±0.144 8.17	±2.162 25. 74	±7. 298 20. 46
P >0.05	NS	NS	NS	NS
G2 very good	1.25± 0.109	8.433± 0.69	27. 336± 2.043	24. 29± 7. 432
P >0.05	NS	NS	NS	NS
G3 good	1.005± 0319	8.506± 0.281	29.187± 6.29	28.082± 14.59
P >0.05	NS	NS	NS	NS
G4 medium	1.10 ± 0. 08	8.159 ± 1. 07	29.76 ± 2. 626	27.193 ± 5. 72
P >0.05	NS	NS	NS	NS

Figure (4-1): The levels of vitamin E (mg / dl) in the sera of female students in the excellence, very good, good, and medium level groups.

The level of super oxide dismutase (SOD) activity:

The levels of (SOD) were measured as shown in. Table (4-1) ,the mean ± standard deviation of the enzyme was (44 0.1447 8.17) units / liter for the G1 group and (8.433 ± 0.699) units / liter in the serum of the G2 group, while it was, (8.506 ± 0.281) units / L in serum group of G3 and (8.159 07 1. 07) units / l in G4 group as in Figure (4-2). The results show according to the table There are no statistically significant differences between the study rate (intelligence) and the effectiveness of the enzyme. here is a study between the activity of the enzyme and the level of emotional intelligence for irritable colon patients, where the results proved consistent with the results of this study where the level of enzyme decreased significantly for those with little emotional intelligence compared to others, this indicates that this enzyme is antioxidant (33).
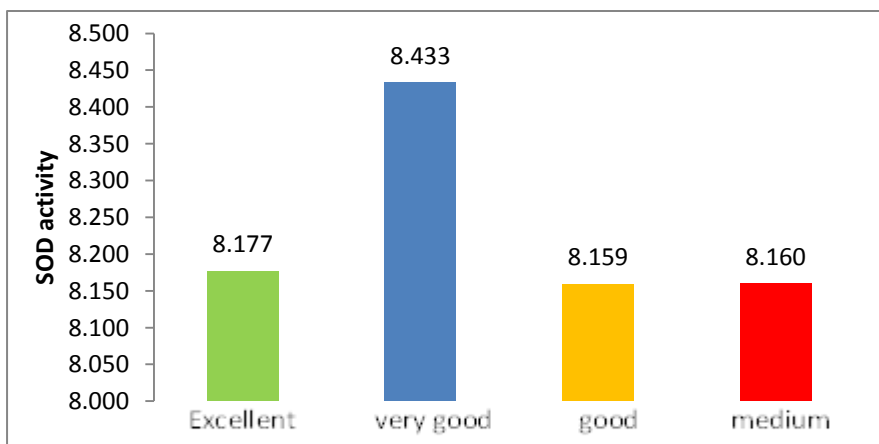
Figure (4-2): The average levels of the activity of the enzyme (SOD) in the sera of female students groups (G1, G2, G3,and G4)

The level of glutathione:

The serum levels of glutathione were measured in female serum. Table (4-1) shows that the mean ± standard deviation was (2.162± 62 25.74) units / l for the excellence group and (27.333 ± 2.043) units / l in the very good serum group, whereas, it was (29.187 29). 6.29) units / l and (29.762 ± 2. 626) units / l in the serum of the two groups of good and medium as shown in in Figure (4-3).

We noting that there is a significant increase in the level of glutathione as the study level of the students is decreases. That may be caused by the anxiety and for the excellence students group, this result agree with a finding at the University of Samarra about the effect of anxiety before and after the exam on the level of glutathione which was decreased before the exam and increase after the performance of the exam because of the fact that antioxidants are exceed free radicals (35) this result also agree with (36)
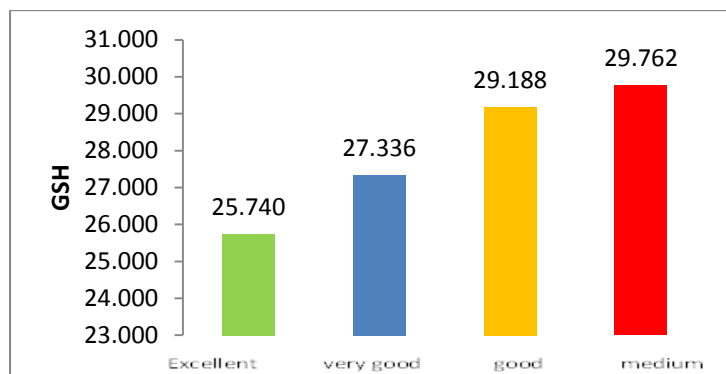

Figure (4-3): The average levels of glutathione (mmol / L) in sera of female students in the study groups.

Peroxy Nitrite Level:

The efficacy levels of peroxy nitrite in female serum were measured. Table (4-1) shows that the mean ± standard deviation was (. 20.46 ± 7.298) units / liter and (27.1933 ± 5. 72) units / liter in the serum of the two groups of good and medium rat as shown in Figure (4-4), as we note a significant increase in the level of peroxy nitrite whenever the lower level of study level of students and the reason is due to increased oxidative stress may contribute to impaired brain function and lack of cognitive activity, while peroxy nitrite decreases with higher level of study level this is led to decrease id free radicals and lipid peroxidation. The intelligence have a Good effect on the composition of the elimination of free radicals. The literature did not refer to of a relationship between the level of intelligence and oxidative stress.
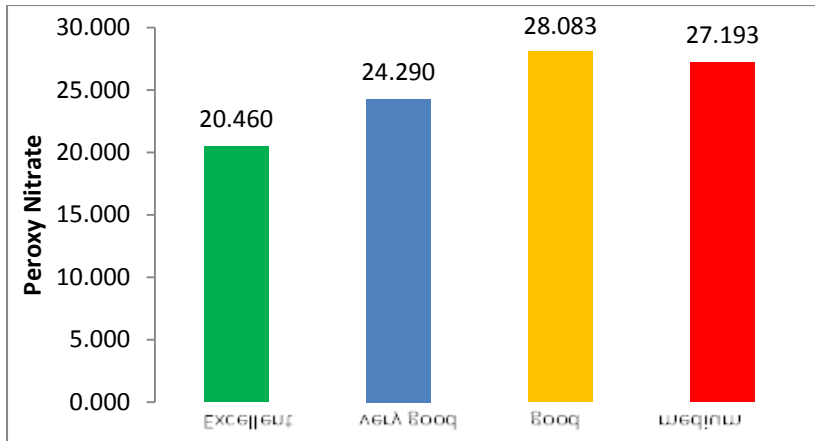
Figure (4-4): The average levels of peroxy nitrite (mmol / L) in the sera of female students in the fourth groups.
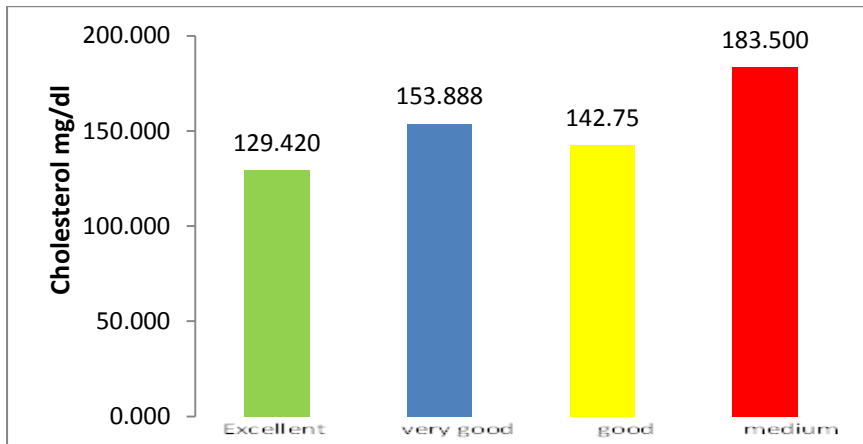
Serum cholesterol level:

Female serum cholesterol levels were measured. Table (4-2) shows that the mean ± standard deviation was (129.4286 ± 17.15476) mg / 100 cm^3 for the excellence group (G1) and (153.8889 ± 18.14831) mg / 100 cm^3 in the serum of the very good group (G2), while it was (142.75 ± 17.75025) mg / 100 cm^3 and (183.5 ± 17.4069) mg / 100 cm^3 in serum of the two groups (G3, G4) of good and medium rate as in Figure (4-5) that the level of cholesterol decreased significantly at the level of significance (P≤ 0.05) in the (G1)group, while the level of cholesterol significantly increased with the increase of the study level(P≤ 0.05). i. e, in the average group and this proves that cholesterol is affected by the level of study level where less with the high level of study, that this decline in the level of Cholesterol shows that intelligence and mental activity have reduce the cholesterol level of the excellence group while the level of cholesterol has increased due to lack of mental and cognitive activity of the medium group, as well as irregular exercise, eating an unhealthy diet, not maintaining a healthy weight, and stress all these factors effects on cholesterol and raises its level and this is consistent with research (Emeka E.N, and others) which shows the high cholesterol in university students under the pressure of the exam compared to the non-exam period (37).

Table (4-2) Average ± Standard deviation of cholesterol level, triglycerides, and the rate of mass in female serum in the study group totals Excellence, Very Good, Good, Average.

groups	Cholesterol mg/100cm^3	Triglycerides mg/100cm^3	BMI kg/m^2
G1 excellence	129.4286± 17.1547	51.888 ± 18.5704	23.25±3.535
P >0.05	0.05	NS	NS
G2 very good	153.888 ± 18.1483	55.3088 ± 12.4269	24.8 ±4.391

P >0.05	0.05	NS	NS
G3 good	142.75± 17.7502	57.041± 28.609	24.18 ±3.572
P >0.05	0.05	NS	NS
G4 medium	183.5± 17.4069	61± 25.4263	26.4 ±5.594
P >0.05	0.05	NS	NS

Figure (4-5): The average of cholesterol levels (mg / 100 cm^3) in the sera of female students in the study groups.

Level of serum triglycerides:

Triglyceride levels were measured in female serum. Table (4-2) shows that the mean ± standard deviation was (51.888 ± 18.5704) mg / 100 cm^3 for the G1 group and (55.3088 ± 12.4269) mg / 100 cm^3 in the serum of the G2 group, whereas, (57.041 ± 28.609) Mg / 100 cm ^{3} and (61 ± 25.4263) mg / 100 cm ^{3} in serum of the two groups good and medium (G3,G4) as in Figure (4-6) as we note a significant increase in the level of triglycerides with the lower of the study level that the study level has a good effect in reduce the level of lipids in the first group and the higher the ratio, the lower the study level in the average group because they have fast meals and irregular food, especially sweets and dressing and not eating fruits and replaced with industrial juices and soft drinks and not eating healthy meals, and eating in front of television and telephone therefore increased the proportion of lipids, our result agree with the result (Mervat Theeb) where the percentage of body fat increase with the lower of the study level (38).
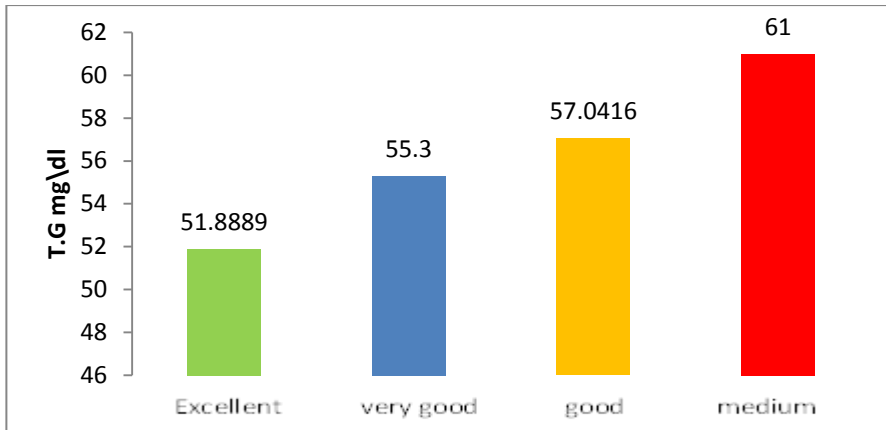
Figure (4-6): cholesterol levels (mg / 100 cm^3) in serum of female students in the study group.

BMI:

BMI levels were measured in female serum. Table (4-2) shows that the mean ± standard deviation was (23.25 ± 3.535) kg /m^2 for the excellence group (G1) and (24.8 ± 4.391) kg / m^2 in the serum of the very good group (G2), while it was (24.18 ± 3.572) kg / M^2 and (26.4 ± 5.594) kg / m 2 in the serum of the two groups (G3, and G4) as in Figure (4-7), where we note a significant increase in the level of BMI as the study level decreased. The BMI is lower in the excellence group. The students with the G1 group level have a good BMI, which indicates the activity and effort exerted by the students and their lack of interest in food and fast food and their interest in healthy food and study. Obesity may be associated with a significant decrease in brain size and a lower density in the capillaries feeding it, according to a study (39). Reduced in the size of the gray and white area (Gray & White Matter) These two areas, have roles in the control of perception, memory and information retrieval, and these data may be the cause of the negative impact of obesity on the level of student achievement, and thus we conclude that the, physical and psychological effects the social factors associated with obesity can be a cause and effect factor for low level of academic achievement.
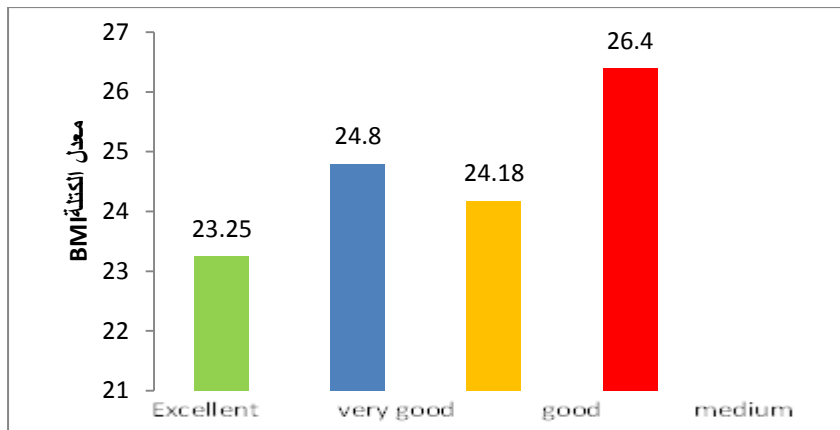
Figure (4-7): levels of BMI (kg / m ^{2}) in the sera of female students in the study groups.

Study the correlation coefficient between the level of vitamin E and the measured data:

The correlation coefficient values (r) were studied between the level of vitamin E and the data measured in female serum, which included the level of superoxide dismutase (SOD), glutathione, peroxy nitrite, triglycerides, cholesterol, and BMI..

Effectiveness of SOD

The results showed a positive correlation between the level of vitamin E and the activity of the superoxide dismutase (SOD) in groups G1 and G4, where the correlation coefficient values were positive (0.144891, 0.972878), respectively, as in Figures (1, 4) in Appendix A in While the relationship was negative in groups G2 and G3, the correlation coefficient values (-0.832 and -0.1024) respectively, as in Figures (2, 3) in Appendix A. the level of inzyme has been increased in the first group (excellance), and G3(medium) groups, this is shows that the higher the enzyme the higher the level of vitamin E, and this indicates that both the vitamin and the enzyme antioxidants and this agree with the result (Giray B, et al) of the effect of vitamin E on the antioxidants enzyme of dialysis patients where high vitamin led to an increase in the level of enzyme (SOD) where there is a weak positive relationship between them. (40).

Level of Glutathione:

The results showed that the relationship between the level of vitamin E and glutathione was positive in the groups (G1, G2, G3 and G4), where the correlation coefficient values was (0.104, 0.26054, 0.21649, and 0.54699) respectaively, as shown in Figures (5, 6, 7 and 8) in the appendix (B).

The strong positive relationship between vitamin E and glutathione for all groups is a proof that the vitamin is antioxidant as glutathione, where the vitamin increases with the increase of glutathione level, and that antioxidants increase the effectiveness of students have thus increased the vitamin, and this is consistent with the result of (Jain SK. et al) which they

found Positive linearity between the level of glutathione and vitamin E for children with type 1 diabetes (41).

Peroxy nitrite level:

The results showed that the relationship between the level of vitamin E and the level of peroxy nitrite was positive in groups G1, G2 and G4 where the correlation coefficient values (0.16325, 0.23411, and 0.89336, respectively, as in Figures (9, 10 and 12) in Appendix (C). While the correlation was negative in the G3 groups, the correlation coefficient was (0.078 -, as in Figure (11) in Appendix (C).

The good positive relationship between the level of peroxy nitrite and vitamin indicates that the rise of free radicals peroxy nitrite the higher the level of Vitamin aggregates for excellence, very good, and medium academic level, as it can increase oxidative stress in spite of Vitamin ;is especially important in places such as artery walls, brain, liver, eyes and skin, which is essential in all tissues in the body and is a powerful fat-soluble antioxidant, plays important roles in removing free radicals and neurological function. The literature suggests a correlation between peroxy and vitamin E.

Triglycerides:

The results showed that the relationship between vitamin E level and TG level was positive in groups G1, G2 and G4, where the correlation coefficient values (0.0407, 0.15644 and 0.61728) respectively, as shown in Figures 13, 14 and 16 in Appendix (D). The relationship was negative in the G3 group, where the correlation coefficient was (-0.225) as shown in Figure (15) in Appendix (D). The positive relationship of the groups G1, G2 and G4 means an increase in the level of lipids in the blood as high levels of triglycerides can prevent the vitamin E from reaching the tissues that are particularly needed for those who are obese or have Metabolic Syndrome, where they are exposed to low absorption of this vitamin. The high level of lipids in the blood, which causes an increase in the level of oxidative stress, where the vitamin role is the removal of free radicals oxidized, but because of the high fat remains stuck in the blood circulation instead of access to tissues (42) This corresponds to the study where the vitamin rose fat.

Cholesterol:

The results showed that the relationship between the level of vitamin E and the level of cholesterol was positive in groups G1 and G4, where the correlation coefficient values (0.3369 and 0.59785) respectively, and as in Figures (17 and 20) in Appendix E, while the relationship was negative in The G2 and G3 groups had the correlation coefficient values of (-0.2406 and -0.2503), respectively, as in Figures 18 and 19 in Appendix E.

The negative relationship between cholesterol and vitamin E can be attributed to an increase in the level of vitamin and low level of cholesterol, because of absorption by the cells. (LDL) contain a large amount of vitamin E and that LDL enters cells through the mechanism defined by receptors and therefore the positive link between cholesterol and vitamin E

corresponds to a study on the transport of vitamin E in plasma and its binding to lipoproteins in plasma of non-approved diabetes on insulin (43).

BMI:

The results showed that the relationship between vitamin E level and BMI was positive in the G1 group where the correlation coefficient values were (0.79901) and in Figure (21) in Appendix F, while the relationship was negative in the groups G2, G3 and G4 where The correlation coefficient values (-0.0613, -0.0868 and -0. 5883), respectively, as in Figures 22 (23, and 24) in Appendix (F). The positive value of the correlation between the vitamin and the BMI of the excellence group indicates that the vitamin increases with increasing BMI while the lower the level of academic study the higher the rate of mass and the lower the level of vitamin increases the BMI, and this is proved as the relationship became negative with the rest of This finding is consistent with a study of correlations between BMI and prevalence of low micronutrient levels among adults in the United States (44) where the correlation between the vitamin and the body mass index was negative, ie, the lower the vitamin level increase the BMI. The vitamin concern as antioxidant thus reduce oxidative stress and lipid level, thus reduce BMI.

Intelligence level - :

The results showed that the relationship between the level of vitamin E and the level of intelligence was positive in the groups G1, G2, G3 and G4 where the correlation coefficient values were (0.104, 0.26054, 0.21649, 0.54699) respectively, as in Figures (25, 26, 72 and 28) in a Bendix.

The result of the wave and for all groups of correlation between the level of intelligence and the vitamin indicates that the greater the level of vitamin increased intelligence and this is what we wanted to prove during the study where the vitamin has a good effect of mental development, intelligence and high in the level academic study, after it has been scientifically proven that the presence of Vitamin E in the body helps memory Significantly in recording and retrieving information seamlessly, as a Vitamin E has an effect on cell activity as it is an antioxidant and helps the quality of the nervous system to regulate glucose in the brain, which is the main brain food. This results consistent with the study of relationship between the antioxidants vitamins in period of birth and Heavy metals, growth, and cognitive development for children aged 5 years. (45).

Conclusions

After conducting this study on the students of Islamic schools to find out whether vitamin E has any effect on the level of intelligence has been concluded that:

Vitamin E has a good effect on the academic level and since it is an antioxidant; it raises the level of the academic study higher the level of vitamin.

It also has a good effect on lipids, especially cholesterol, as the level of the excellence group decreased and rose at the medium group.

It also reduced the oxidative stress to the group of excellence and raise the oxidative stress at the medium group and this also confirms that the vitamin reduces oxidative stress

It also reduced the BMI level of the excellence group and this confirms that it reduced obesity.

Recommendations

1. I recommend studying the effect of vitamin on the study level for both sexes and make a comparison between them.
2. Study the effect of vitamin D3 on intelligence, especially female students where it is known that poor diet and obesity is one of the causes of low vitamin D3.
3. Studying the effect of ready foods and not eating breakfast on vitamin B12 for Islamic school students.

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