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A Comparative Study between Effect of Physical Activity and ADAM, Vs Iron Salts on Some Physical Traces of Underground Water

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ABSTRACT

Iron deficiency is estimated to be the most common cause of anemia worldwide. The purpose of this study was to investigate the effect of dietary supplement ADAM (olive oil, vinegar and sodium chloride) and traditional iron salts, together with physical activity on anemic female students. Our study consists of forty anemic female students divided into four equal groups, ten students in each group; 1st group ingested ADAM with exercise, 2nd group ingested ADAM without exercise, 3rd group supplemented with traditional iron salts with exercise, 4th group supplemented with traditional iron salts without exercise. Blood samples were drawn (5ml) for analysis of hemoglobin by spectrophotometer, iron, total iron binding capacity and ferritin by Radioimmunoassay, O2 using gas analyzer. The variables exerted VO2max using Harvard step test, heart rate by pulse meter, fitness index by equation; the variables were detected (pre-post) training program. Results: The results indicated a positive result for ADAM with physical activity compared with ADAM alone, also iron with physical activity variables overcome the variables of iron salts alone while, ADAM with physical activity variables exceed iron salts with physical activity. Conclusion: using physical activity with ADAM, induces a positive result in curing female anemic students from traces of underground water.

Key words: *ADAM, olive oil, iron salts, female anemic students, physical activity*

INTRODUCTION

Anemia refers to a condition in which the number of red blood cells or their oxygen-carrying capacity is insufficient to meet physiological needs. Anemia adversely impacts health and social economic development; children and women are particularly vulnerable. In children, anemia may detrimentally affect cognitive development and physical growth from infancy to adolescence and is associated with increased morbidity. Anemia continues to be an important public health concerned globally [1]. It affects millions of people, especially in developing countries [2]. The world wide anemia prevalence in 2010 was 32.9% in children and adults; it is considerably more prevalent in developing than in developed countries [1].

The most common cause of anemia around the world was iron deficiency, and about 1.2 billion people have suffered from it by 2013. Based on World Health Organization (WHO), iron deficiency is the most prevalent nutritional issue in the world that influences about 25% of the world population, especially women in the childbearing age [3]. Other causes of anemia include parasitic infections, other nutritional deficiencies, such as folate, vitamin B12, and vitamin A deficiency, chronic inflammation, and inherited disorders. Hemoglobin levels can also vary greatly according to age, sex, altitude, smoking, and pregnancy status [4].

Iron is one of the most essential trace elements in the body. Iron deficiency is one of the most prevalent nutrional deficiencies in rural countries. There are two broad categories of iron in the body: essential iron and

storage iron. Essential iron is the one which is involved in normal metabolism of the cells, while storage iron is present in two major compounds ferritin and hemosiderin [5, 6].

American Academy of Nutrition and Dietetics [7] added that there is exogenous source of iron, from animals like fish, meat, liver and vegetable sources like cereals, nuts and dates. Endogenous form iron is utilized from ferritin of RE system and also intestinal mucosal cells. Alsoiron obtained from red cells is also reutilized [8, 9]

Olives are important nutritive elements and used in traditional cuisine due to its oil, and in medicine due to its curative effects, olive trees are cultivated in mediterranean basin and in other continents. Olive oil is produced in Spain, Greece, Turkey, Tunisia, Portugal, Morocco, Algeria and Egypt among other countries. According to the latest reports, olive oil production is about 2,539,000 tons globically in the year 2016/2017 with the highest amount of oil produced in Spain, 1,286,600 tons [10, 11].

Nassima et al. [11] added that olive leaves perceived an interest, for folk medicine, as it contains anti-carcinogenic, anti-inflammatory and antimicrobial properties.

Olive oil is recognized as a healthy food and is reported in research to bring good health and wellness, due to its content of unsaturated fatty acids (>85%), which is known to reduce risk factors that may affect the heart. brain and liver functions. The benefits comprise also anti-infectious diseases, anti-cancers and tumors, and also it might decelerate the aging process, control diabetes mellitus, regulate blood pressure and lipid, lower clotting, help in digestion process and absorption of nutritional materials, and posses antioxidant effects [12].

In accordance to the wide benefits, ADAM (olive oil, vinegar and sodium chloride) posses very important benefits for the digestive organs and blood pressure. Also, it has antioxidants, decreases lipids and inflammation, and helps to decrease DNA damage due to its action on oxidants which decreases the process of inducing cancer [13, 14].

Also, what is known as black vinegar (BV) also named as Kurosu which is produced from unpolished rice with rice germ as it contains higher amounts of amino acids and other organic ones [15].

Vinegar is a fluid with a strong taste; it can be produced from grape, oranges, beet, water-melon, sugarcane, apple, strawberry and honey. It is composed of water, solids, volatile, organic substance and other constituents that give the vinegar taste, and smell which unables us to notice the flavor of the nutrients. It gives the food more acceptable taste and helps to digest the food [12, 16]. Also, it has medical effects as it is antidote for poisoning alkali therapy; it is also used as treatment for alopecia, head lice, skin wounds, and headaches; It also stops bleeding, cleans the mouth, and treats exhaustion [14, 17, 18].

Physical activity has both a central and continuous effect on health and fitness for young and old people and must be a life style beginning from childhood and adolescence to adulthood. Physical activity is a complex behavior which includes different domains such as sport participation, aerobic and anaerobic activities. Also there are different techniques which include physical activity measures specially pulse rate registration and oxygen with VO2MAX assessment together with biochemical measurements [19, 20].

The purpose of the study was to investigate the effect of dietary supplement ADAM (olive oil, vinegar and sodium chloride) and traditional iron salts, together with physical activity efficiency on anemic female students. The research hypnotized that ADAM and traditional iron salts, as well as physical activity can efficiently help curing anemic female students. It is known that ADAM contained iron element, and analysis of drinking water turned out to contain the element triangular.

SUBJECTS AND METHODS

Subjects:

Forty anemic female students were divided into fourequal groups, ten students in each group, 1st group ingested ADAM with exercise, 2nd group ingested ADAM without exercise, 3rd group supplemented with traditional iron salts with exercise, and 4th group supplemented with traditional iron salts without exercise. Thestudents of this study are from faculties of Assiut University branch of the new valley. A written informed consent was taken from all subjects participated in our study.

Research method: our study used (pre/post) measurements of four groups, due to suitability of the nature of the study.

Pilot study

- Three female students were the participants of the pilot study.
- They were from the same group chosen for the study for period of 3 days before the main study (15/1/2017), the reason to perform the pilot study is to:

i. investigate the equipment and tools.
ii. know the problem that might be faced during the study.
iii. determine the best way to perform measurements and record data.

The main study:

Pre-measurement was done on 1/2/2017.
The proposed training program:
The application program was applied for 12 weeks.
Training units 3 units/week.
Total number of units: 36 units.
Training unit time 30-45 minutes.
Intensity of loads begins below the average in the first two units, progresses to the average for the rest of units.
Rest interval for 1-2 minutes.
The training load increased gradually by 5% of the maximum.

Inclusion criteria:

Female with age from 18-24 years old.
Sever anemic patients.
Iron deficiency anemia.

Exclusion criteria:

No evidence of anemia on Hgb determination.
Females out of our study range must be excluded.
Individuals who take iron supplementation.
If there were any other medical complications for example chronic diseases.
Patients who take medication that might affect their performance.
Smokers.
Recent blood transfusion.

Methods

Olive oil

Olive oil was obtained from the New Valley Governorate, Egypt. Its component and active constituents was studied by gas-chromatograms, also physiochemical properties were studied.
Vinegar was obtained from the New Valley Governorate, Egypt. Also its components were studied.
Administration doses were:
ADAM: The students took 10 ml olive oil, 5 ml vinegar, and 1gm sodium chloride once daily before breakfast.
Traditional iron salts: The student took one capsule of 5 mg iron before breakfast.

Sample Collection

5 ml venous blood was withdrawn before and after the experiment from all participants for determination of the physiological variables. Blood samples were withdrawn by a specialist; laboratory measurements were conducted in special lab. All procedures were conducted in accordance with ethical guidelines and with approval from the ethical committee of Faculty of Physical Education Sports, University of New Valley.

Biochemical Analysis

The following parameters were estimated:
Hemoglobin determination using spectrophotometer at 540 nm wave length according the method of Choudhri et al. [21].
Iron determination using method using Radioimmunoassay (RIA) according to method of Goldie and Thomas [22].
Total iron binding capacity (TIBC) determination using method of Radioimmunoassay (RIA) according to method of Goldie and Thomas [22].
Ferritin determination using Radioimmunoassay (RIA) according to method of Goldie and Thomas [22].
O_2 determination using spectroscopic gas analyzer according to method of Lim et al. [23].

Data collection tools:

Height by using rest meter.
Weight by using medical scale.
Physical fitness VO2 using the Harvard step test using platform (step) 50.8 cm high, stop watch, metronome.
Heart rate determined by pulse meter.

Fitness index by equation = (10*test duration/S.)/ (2*sum of heart rate) in recovery period.

Chromatographic conditions

The gas-chromatograms of the fatty acid methyl esters mixtures were recorded on an Agilent Technologies model 7890A instrument coupled with an Agilent Technologies model 5975 C VL MSD mass detectors with Triple Axis Detector and Agilent auto-sampler. The separation into components was made on a capillary column especially designed for the fatty acids methyl esters (FAME) analysis (Supelco SPTM 2560, with the following characteristics: 100 m length, 0.25 mm inner diameter, 0.2 µm film thickness). The ready for injection solutions were prepared in CH2Cl2 of HPLC purity grade. Fatty acids identification was made by comparing for each peak the retention time with those of a standard mixture of 37 fatty acid methyl esters (SupelcoTM 37 Component FAME Mix). In the standard mixture the exact concentration of each component is known. Both standard mixture and each of the fatty acid methyl esters of the analyzed fish oils were chromatographically separated under the same conditions, using the same temperature program (oven initial temperature 140ºC to final temperature 240 ºC, heating rate 4 ºC/min.), injection volume 1µL, split rate 100:1, carrier gas He according to the Supelco specifications. The calibration of the signals was made by taking into account the concentration of each component of the standard mixture, correlated with the detector's response [24].

Signal	δ (ppm)	Proton
A	0.95	-CH3
B	0.85	-CH3 ex
C	1.2	-(CH2)n-
D	1.6	-OCO-CH2-CH2-
E	2.02	-CH2-CH=CH-
F	2.2	-OCO-CH2-
F'	2.3	-OCO-CH2- CH2-
G	2.76	-CH=CH-CH2-CH=CH-
H	3.61	-CH2-OCOR
I	5.36	-CH-OCOR
J	5.4	-CH=CH-

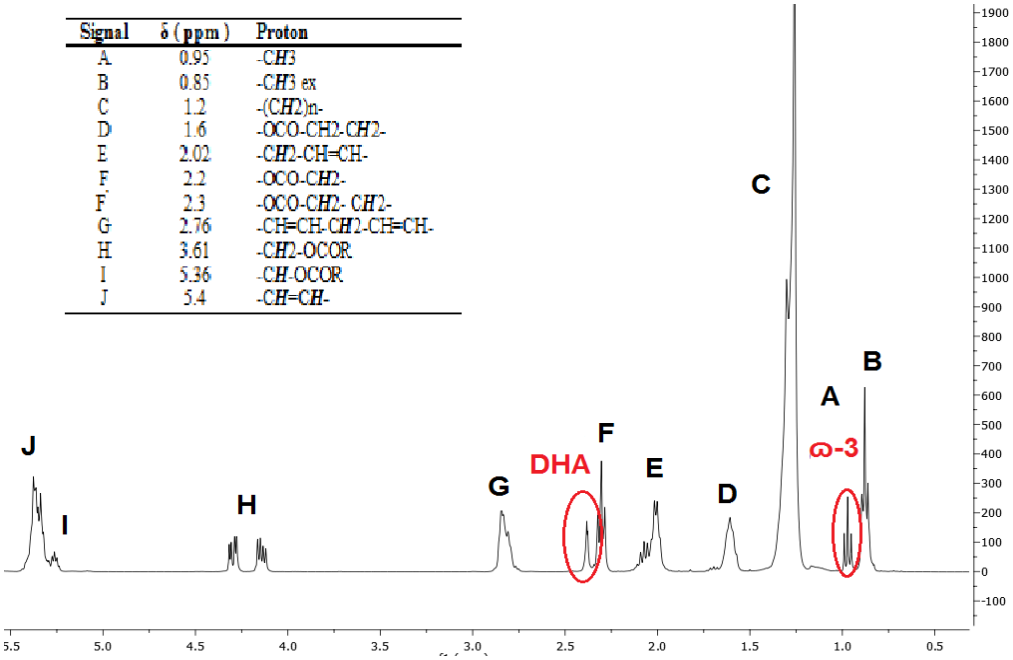

Figure 1: Chromatogram showed the component of olive oil

Table 1: Shows the physiochemical properties of olive oil

Boiling point	700 °C (1,292 °F)
Smoke point	190 °C (374 °F)
Solidity at 20 °C (68 °F)	Liquid
Specific gravity at 20 °C (68 °F)	0.911 g/cm3
Viscosity at 20 °C (68 °F)	84 cP
Refractive index	1.4677
Iodine value	75
Acid value	0.8 mg KOH/g oil
Saponification value	184 mg/g
Peroxide value	20 milliequivalents/kg
Total unsaturated fatty acids	> 85%
Total saturated fatty acids	< 15%
Energy 100gm	880 kcal (3700KJ)

Table 2: shows the amount of fatty acids in olive oil

Fatty acid	Percentage
Oleic acid	74%
Linoleic acid	8.1%
Palmitic acid	12.9%
Stearic acid	1.3%
α-Linolenic acid	0.4%

Table 3: Shows the composition of vinegar per 100 grams

Contains	Percentage
Acetic acid	5 g
Carbohydrates	1g
Energy	21 Kcal
Sugar	0.4g
Calcium	7 mg
Iron	0.2 mg
Magnesium	5 mg
Phosphorus	8 mg
Potassium	73 mg
Sodium	5 mg

Statistical Analysis:

The statistical analysis was carried out using SAS, PC statistical software for sensory evaluation of date products. The results were expressed as mean ± SE. Data were analyzed by one-way analysis of variance (ANOVA). The differences between means were tested for significance using least significant difference test (LSD) at (P & lt; 0.05) (SPSS, 1986).

RESULTS AND DISCUSSION

Table (1) shows the natural and chemical properties of olive oil. The boiling point and smoking were 700 and 190 ° C, respectively. While the Solidity was at 20 °C on a liquid image

The specific gravityand viscosity were estimated at 0.911 and 84cp respectively, While the refractive index of oil was 1.4677 which was estimated by the refract meter.

From table (1) the sapon, iodine, and peroxide and acidity numbers were opened 184, 75, 20 and 0.8 respectively.

Table 4: Shows the measurement of the hemoglobin, oxygen, pulse and oxygen consumed for the third and fourth groups before taking olive oil and at the end of the period of taking olive oil for the sports practitioner and non-sports practitioner

Samples	Sports Practitioner +Olive Oil														Non-Practitioner + Olive Oil											
	Hb gm/dl		Serum Iron ug/looml		Ferritin ug/looml		TIBC gm/dl		O2		Pulse pulse/min		VO2 max ml/kg/min		Hb gm/dl		Serum Iron ug/looml		Ferritin ug/looml		TIBC gm/dl		O2		Pulse pulse/min		VO2 max ml/kg/min	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
1	5.00	12.00	30.00	80.00	7.94	20.00	690	450	97.00	98.00	70.00	67.00	45.50	82.00	5.00	11.00	30.20	75.00	7.12	16.38	690	385	95.00	97.00	67.00	67.00	42.00	65.00

2	5.00	12.00	30.00	97.00	7.94	37.00	605	450	97.00	98.00	70.00	67.00	50.00	82.00	5.00	11.00	30.20	86.00	7.12	23.89	605	350	95.00	97.00	67.00	67.00	42.00	65.00
3	5.50	13.00	37.70	99.00	9.00	40.24	600	420	98.00	98.00	87.00	74.00	52.00	86.00	5.45	12.00	36.30	90.00	9.54	25.70	600	310	97.00	98.00	79.00	75.00	58.00	69.20
4	5.65	13.85	40.00	100.00	9.56	43.00	575	405	98.00	99.00	89.00	74.00	55.00	87.00	5.75	12.15	40.18	99.00	9.65	29.60	575	250	98.00	98.00	85.00	80.00	62.10	72.00
5	5.20	12.70	35.00	90.00	8.50	35.00	650	435	97.00	98.00	75.00	71.00	47.50	85.00	5.12	11.90	33.00	80.00	8.15	20.40	650	370	97.00	97.00	78.00	75.00	50.00	68.00
6	5.20	12.80	35.66	95.00	8.55	36.00	620	430	97.00	98.00	80.00	72.00	48.00	86.00	5.14	11.90	33.00	86.00	8.17	22.10	620	365	97.00	97.00	78.00	74.00	52.00	68.10
7	5.10	12.50	30.14	89.00	8.16	30.00	670	445	97.00	98.00	71.00	69.00	47.00	85.00	5.10	11.85	32.15	78.00	8.00	18.00	670	380	96.00	96.00	78.00	75.00	44.00	67.00
9	5.08	12.00	30.54	89.00	8.10	22.00	688	450	97.00	97.00	71.00	68.00	46.50	84.00	5.10	11.38	31.15	77.00	7.81	17.90	688	380	96.00	97.00	73.00	70.00	43.00	66.00
9	5.60	13.65	39.90	100.00	9.15	42.20	637	415	98.00	99.00	87.00	74.00	54.00	87.00	5.65	12.10	38.81	96.00	9.55	29.00	637	349	97.00	98.00	79.00	75.00	60.20	70.00
10	5.38	12.80	37.00	99.00	9.00	40.00	600	425	98.00	98.00	81.00	73.00	51.00	86.00	5.22	12.00	34.00	88.00	9.24	24.00	600	300	97.00	98.00	79.00	75.00	57.00	69.00
Average	5.27	12.73	34.59	93.80	8.59	34.54	634	433	97.40	98.10	78.10	70.90	49.65	85.00	5.25	11.73	33.90	85.50	8.44	22.70	634	344	96.50	97.40	76.30	73.30	51.03	67.93

Table (4) shows the first two groups given olive oil with vinegar and salt and did not exercise while the second group took the same group with exercise.

Table 5: shows the measurement of the hemoglobin, oxygen, pulse and oxygen consumed for the third and fourth groups before taking the iron and at the end of the period of taking the iron for the sports practitioner and non-sports practitioner

Samples	Sports Practitioner + Iron Disks												Non-Practitioner + Iron Disks											
	Hb gm/dl		Serum Iron ug/looml		Ferritin ug/looml		TIBC gm/dl		O2		Pulse pulse/min		VO2 max ml/kg/min		Hb gm/dl		Serum Iron ug/looml		Ferritin ug/looml		TIBC gm/dl		O2		Pulse pulse/min		VO2 max ml/kg/min	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
1	5.15	10.20	32.00	78.54	8.50	9.80	670	530	91.00	93.00	75.00	77.00	43.00	55.00	5.12	9.40	33.10	60.90	8.00	9.40	600	525	91.00	91.00	80.00	79.00	45.00	45.00
2	5.62	10.90	40.20	80.90	9.15	10.70	600	505	95.00	95.00	80.00	75.00	57.00	64.00	5.51	10.10	36.30	75.40	9.45	11.70	680	505	94.00	94.00	81.00	81.00	59.00	60.00
3	5.20	10.34	34.00	79.74	8.55	10.10	650	502	91.00	94.00	77.00	80.00	54.00	57.00	5.14	9.80	33.40	69.70	8.10	9.10	620	540	91.00	91.00	80.00	80.00	52.00	52.00
4	5.40	10.80	37.00	80.90	9.00	10.24	605	565	92.00	95.00	84.00	78.00	57.00	62.00	4.40	10.00	35.30	73.30	9.20	11.00	675	505	92.00	93.00	81.00	81.00	57.50	59.00

5	5.65	11.00	42.67	81.00	9.56	11.00	600	540	95.00	96.00	87.00	77.00	58.00	66.00	5.80	10.34	38.90	76.00	9.65	12.00	695	510	94.00	94.00	82.00	82.00	60.00	61.00
6	5.12	10.10	30.43	75.73	8.16	9.55	688	522	90.00	91.00	86.00	77.00	42.80	54.50	5.10	9.45	32.85	57.90	7.90	9.00	600	530	90.00	90.00	76.00	76.00	43.00	43.20
7	5.75	11.10	43.00	82.46	10.77	11.10	575	580	95.00	96.00	75.00	80.00	60.00	66.50	5.90	10.40	40.90	77.83	10.10	12.60	705	610	95.00	95.00	82.00	82.00	60.00	62.10
8	5.10	10.00	30.10	66.98	8.10	9.15	690	595	85.00	91.00	87.00	75.00	42.00	53.00	5.00	9.22	30.15	55.10	7.64	8.90	595	515	85.00	85.00	75.00	75.00	43.00	43.00
9	5.38	10.40	36.90	80.10	9.00	10.20	620	500	92.00	95.00	85.00	76.00	56.00	60.00	5.20	10.00	34.00	72.00	9.00	10.89	650	560	92.00	92.00	81.00	81.00	57.00	57.00
10	5.00	10.00	30.10	65.00	7.94	8.65	710	600	83.00	90.00	85.00	75.00	42.20	52.00	5.00	9.00	29.20	50.00	7.20	8.38	580	500	83.00	83.00	72.00	72.00	42.00	42.00
Average	5.34	10.48	35.64	77.14	8.87	10.05	641	544	90.90	93.60	82.10	77.00	51.20	59.00	5.22	9.77	34.41	66.81	8.62	10.30	640	530	90.70	90.80	79.00	78.90	51.85	52.43

Table (5) shows the first two groups given iron tablets and did not exercise while the second group took iron tablets and practiced sports

Table 6: Measurement of hemoglobin, oxygen, pulse and oxygen consumed for four groups after the statistical analysis of the results

treatment	Hb		Serum Iron		Ferritin		TIBC*		O2		Pulse		VO2 max	
	gm/dl		ug/looml		ug/looml		gm/dl				pulse/min		ml/kg/min	
	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After	Before	After
Sports Practitioner + Iron Disks	5.337± 0.263	10.484± 0.427^{c}	35.62± 5.06	77.135± 6.16^{c}	8.873± 0.843	10.049± 0.786^{c}	640.8± 46.841	543.9± 38.573^{a}	90.9± 4.094^{b}	93.6± 2.221^{b}	82.1± 4.886	77± 1.885^{a}	51.18± 7.666	59± 5.557^{c}
Non-Practitioner + Iron Disks	5.217± 0.432	9.771± 0.479^{d}	34.41± 3.609	66.813± 9.95^{d}	8.624± 0.975	10.297± 1.511^{c}	640± 46.427	530± 33.665^{a}	90.7± 3.888^{b}	90.8± 3.938^{c}	79± 3.431	78.9± 3.413^{a}	51.85± 7.789	52.3± 8.343^{d}
Sports Practitioner +Olive Oil	5.271± 0.244	12.73± 0.652^{a}	34.594± 4.117	93.8± 6.613^{a}	8.59± 0.564	34.544± 8.098^{a}	633.5± 40.056	432.5± 16.202^{b}	97.4± 0.516^{a}	98.1± 0.567^{a}	78.1± 7.680	70.9± 2.923^{b}	49.65± 3.274	85± 1.825^{a}
Non-Practitioner + Olive Oil	5.253± 0.268	11.728± 0.437^{b}	33.899± 3.479	85.5± 8.086^{b}	8.435± 0.987	22.697± 4.596^{b}	633.5± 40.056	343.9± 43.942^{c}	96.5± 0.971^{a}	97.4± 0.516^{a}	76.3± 5.677	73.3± 4.083^{b}	51.03± 7.957	67.93± 2.245^{b}
LSD	N.S.	0.463	N.S.	7.162	N.S.	4.322	N.S.	31.682	2.626	2.094	N.S.	2.903	N.S.	4.762

*TIBC refers to Total iron binding capacity

Table (6) shows the statistical analysis of the data in Tables (4) and (5). It is clear from the statistical analysis that the four groups, whether they exercised or did not exercise before giving them iron or oil showed no significant difference in the improvement of hemoglobin. But, when the iron or oil tablets were given, there was a significant difference, especially those who took the oil and exercised the sport were the most effective in improving the proportion of hemoglobin. The same results were obtained for the iron ratio in serum and ferritin. The same results were obtained for all groups in case of not taking iron and oil, while the results differed in the

case of taking iron or oil tablets. In addition, the third and fourth quaternary oxygen, which took the oil whether practiced or exercised, gave the best results followed by iron, exercised. The same results were obtained for the four totals in case of VO2.

DISCUSSION

Table (4-6) revealed that there are no significant statistical differences in HB, serum iron, ferritin, TIBC, O2, pulse rate and VO2MAX, which indicated that the female students participated in the study were in complete homogeneity of the measured variables, after the different treatment occurring to the four groups of the study, namely: sports practicing plus iron disks, nonpracticing plus iron disks, sports practicing plus ADAM supplement and nonpracticing plus ADAM. There was a significant statistical change after different types of supplementation of iron disk and ADAM, with sport practicing or non-practicing, indicating that both types of supplements positively affect the variables of the study.

The more prominent changes occurred in the study due to ADAM with sport practicing in different variables of the study except that of TIBC values, which was highest in case of iron disks ingestion plus sports practicing, and the lower values reported for olive oil and ADAM supplementation with or without sport practicing.

The benefit marker due to ADAM with sports practicing may be due to both of the composition of olive oil specially of fatty acids (oleic, linoleic, palmitic) and that of vinegar which is rich in enerfy and minerals such as calcuim, phosphorus, potassium and iron, that all together help in sustaining health and wellness of the participants. The results were in accordance with that of [13, 16, 17, 21].

The importance of natural supplements was also reported by Mougios et al [25] in inducing agreat benefit for producing higher concentration of hemoglobin, serum iron and ferritin concentration, especially when natural products such as ADAM were added and supported by sport partitioning which in turn help to improve health conditions specially iron anemia. Also it must be remembered that fat is necessary for normal metabolism; For example, olive oil is good source of fat as reported by Cook and reddy [26].

Guyton et al. [27] added other factors affecting iron absorption or lost in the stool, as women lose iron twice more than men due to additional iron lost during menstruation. Also, various dietary factors affect the availability of iron for absorption, for example, the phytic acid found in cereals reacts with iron to form insoluble compounds in intestine, also ascorbic acid is of importance because it aids reduction of iron to the Fe^{+2} form. The importance of this function is indicated by the fact that iron deficiency anemia is a troublesome and relatively frequent complication of partial gastrectomy.

In plasma, Fe^{2+} is converted to Fe^{3+} and found by the iron transport protein transferrin. Normally, transferrin is about 35% saturated with iron and normal iron level is about 130 mg/dl in men and 110 mg/dl in women. Some of iron is stored in ferritin, the remainder is transported by ferroprotein. [28]. Barrett et al. [29] stated that the regulations of iron absorption are through: diet intake of iron also regulated by the storage of iron in the body and lastly by Rbcs formation in bone marrow and released by erythropoietin hormone. TIBC as indicated in Table (6) was noticed to decrease after iron, olive oil, and vinegar supplementation, and is an important parameter and laboratory test for assessing iron metabolism of patients. Adamson [30] reported that the concentration of transferrin in plasma is approximately 300 mg/dl. This amount of transferrin can bind 300 mg of iron per deciliter, so that this represents the TIBC of plasma. However, the protein is only one third saturated with iron. In case of iron deficiency anemia, the protein is even less saturated with iron, whereas in condition of storage of excess iron in the body as in case of hemochromatosis the saturation with iron is much greater than one third [31]. O_2 concentration and VO2MAX (Table 2-4) revealed increased concentration after sports partitioning and olive oil, vinegar and iron supplementation. The higher values were marked in case of sports activity with olive oil and vinegar supplementation which denotes the importance of physical activity plus supplementation in inducing this improvement in O_2 concentration and VO2max which indicated a higher physical fitness and improvement of performance as the result of the physical activity program preformed in this study.

West [32] reported that in the resting state, blood flow in comparatively sluggish manner compared to the active state of exercise. The increased blood flow through the lungs causes all the pulmonary capillaries to be perfuse at their maximal rates, thus providing a far greater surface area through which oxygen can diffuse into the pulmonary blood, and that induced a higher diffusing capacities of O_2 which is marked due to continuous and regular training procedures as in case of the study results.

Tables 4-6 also indicated that pulse rate showed a decreased counting per minute in case of sport practicing and

iron or olive oil with vinegar supplementation. The best improvement noticed was related to the action of sport activity and olive oil plus vinegar supplementation. The effect of rationing and systemic physical activity together with olive oil and vinegar supplementation resulting in decreased pulse rate together with an increased VO2max, as the adaptation process, led to an improvement in tissue organs and increase effort abilities as reported in the study and by other researchers [33, 34].

CONCLUSION

It might be concluded that physical activity in relation with ADAM or traditional iron salts supplement induces curing effect from underground water effect on female anemic students.

Recommendation

It is recommended to practice sports in a regular manner in addition to supplements ADAM or traditional iron salts for curing anemia in the right doses prescribed.

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