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A study of the changes in phytate concentration and some parameters in men with oligospermia and azoospermia

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Abstract

In this study, we measure the effect of changes in phytic acid concentration with age, weight, and body mass of infertile men, to assess spermatogenesis and semen parameters. After conducting a statistical analysis of the results, the levels of phytic acid are checked. The total of the study samples was 105 (MP1 = 35, MP2 = 35, MC = 35). An association between phytic acids and body weight and body mass index has been investigated in infertile men. It has also been revealed that there is a connection between phytic acids and certain cellular tissues in the body. It appears that these phytic acids found in food have an effect on human sexual health and this study was able to indicate the risks associated with these changes. An association between phytic acids and body weight and body mass index has been investigated in infertile men. It has also been revealed that there is a connection between phytic acids and certain cellular tissues in the body. These phytic acids found in food appear to have an impact on human sexual health. The study found the direct effect of phytic acid on men, where the results indicated that phytic acid concentrations increased significantly in infertile people. Pearson's test was conducted in order to know the correlations between phytic acid and age, weight, and the rest of the study parameters, where the correlation between phytic acid and age was positive. There was a strong correlation with the total number of sperm, which leads us to conduct further study on the possible relationship between sperm count and phytic acid concentrations in infertile men.

Keywords
Keyword 1 Phytic acid
Keyword 2 Sperm
Keyword 3 Trace element
Keyword 2 Active Sperm
Keyword 2 Infertile

Infertility in humans can be caused by a variety of factors, both physical and emotional. It could be a result of a woman's or man's inability to conceive. Infertility in humans can be caused by a variety of factors, both physical and emotional. It could be a result of a woman's or man's inability to conceive [1].

Human infertility is a growing problem, and it affects about 48.5 million couples around the world. Even though the exact causes of infertility are still mostly unknown, medical progress has made it possible to diagnose and treat a wide range of problems that can lead to infertility. In the U.S., infertility is mostly ignored, even though 1 in 8 couples have trouble getting pregnant. Factors that can contribute to infertility include age, lifestyle, medical history, and environment. Treatments for infertility can range from lifestyle changes to medical procedures such as IVF or IUI. While infertility can be an emotional and difficult experience, it is important to remember that there are resources available to help couples on their journey to parenthood (Mascarenhas et al. 2012). The decline in semen quality of young healthy men worldwide could lead to reproductive disturbances and even infertility. Despite the importance of this phenomenon in public health, little is known about what causes it. This is the reason for this study which aims to evaluate the relationship between the mentioned factors and sperm characteristics [2].

Human male infertility is a widespread problem that can lead to the inability to conceive. Most commonly, the problem relates to the shedding of genetic human fauna that puts stress on male reproductive cells. Physicians can develop a treatment to treat human disabilities specific to men (Poongothai et al. 2009).

The assessment of male infertility is appropriate in finding out the cause of infertility for women who have not become pregnant after twelve months of regular unprotected intercourse and thus investigating the causes of infertility [3]. Most of the male reproductive system is located outside the body. These external organs are the penis, scrotum, and testicles [4]. While the internal organs include the vas deferens, prostate, and urethra. The male reproductive system is responsible for sexual function in addition to urination. The male reproductive system includes a group of organs that make up the male reproductive and urinary function [5, 6]. It performs the following functions in the body: Production, storage, and transfer of sperm (male reproductive cells) and seminal fluid (a protective fluid around the sperm), Sperm emptying by the female reproductive pathway, production, and secretion of male sex hormones [5]. The male reproductive system produces sperm, in addition to storing and transporting it. The sperm are produced inside the testicles [7]. These sperms then unite with the fluid produced by the seminal vesicles and the prostate gland; It is worth noting that the male is born with a complete male reproductive system, but this system does not begin to function until puberty [8]. The following are the internal parts of the male reproductive system: The urethra is the tube that carries urine from the bladder to the outside of the body, and it also ejects semen from the body. Epididymis: It is a long, coiled tube located at the back of each testicle, and its function is to transport, store, and mature the sperms that are produced in the testicles. The vas deferens: It is the part responsible for carrying urine or semen outside the body. It is defined as a long tube that travels from the epididymis to the pelvic cavity, and then to the back of the bladder. Ejaculatory ducts: the part resulting from the fusion of the vas deferens and seminal vesicles. The bulbourethral glands: These glands produce a viscous fluid that drains directly into the urethra. They are located on the sides of the urethra, just below the prostate glands. Prostate gland: The prostate gland is located below the urinary bladder and in front of the rectum, where it contributes to ejaculation and nourishment of sperm. The vesicles: the part responsible for producing the sugar fructose, which provides the sperm with the energy needed for movement [9, 10]. Spermatogenesis is a multifaceted process that occurs in the testicles that results in the production of large quantities of normal spermatozoa (Sperm) via a process known as spermatogenesis. The process of spermatogenesis may be broken down into three primary phases, which are as follows: The first is the process of mitosis, which is the multiplication of spermatogonia; There is meiosis, which is when spermatogonial type B cells enter the prophase of the first meiotic division and chromosomal numbers are reduced from diploid to haploid, and ovulation. They are now known as primary spermatocytes and divide into secondary spermatocytes, which are the precursors to sperm. In the third stage, which is known as spermiogenesis, the round spermatid successfully transitions into the complex structure of the spermatozoon after being divided once more to produce round spermatids (the process of creating spermatozoa) [11].

Methodology

The study included a group of healthy and infertile men who were used as a control group. The total samples of the study were 105, and the division was as follows: Patient group 1 (MP1 = 35), Patient group2 (MP2 = 35), Control group (MC = 35).In order to conduct the study, a questionnaire was used to obtain information about the study participants. A medical scale was used to measure the patient's weight. The ELISA method was used to find the results of the phytic acid test, where the method was the sandwich. And the test concentration measurement method was used as mentioned by the manufacturer (SL0055PI SunLong Biotech). Microscopy was used to determine the activity and count the sperm count.

Results and discussion

Infertility and its problems are among the things that many studies are looking for in finding a solution to it, whether by early detection and identifying the disease and the type of problem or in following up on patients during treatment. For this reason, we have studied phytase acid and its effect it on some chemical variables whose increase, decrease, or presence in the first place can cause an obstacle in the formation of sperm or affect the effectiveness, number, shape, or movement of sperm. The parameters of the study will be explained starting from age and weight up to the last parameter according to the study tables listed in the following:

The mean age of the target samples in the study

Table 1. The Mean+SD for age in study effect of phytic acid with infertility men

Age					
		MP1	MP2	MC	Total
N	-	35	35	35	105
Mean	-	25.666	25.400	28.06	28.86
Std. Deviation	-	5.00951	4.8077	3.473	6.11452
Std. Error	-	1.293	1.241	0.8969	0.7060
95% Confidence Interval for Mean	Lower Bound	22.8925	22.737	26.143	27.45
	Upper Bound	28.4408	28.0624	29.990	30.273
P-value	-	0.000	0.000	0.000	0.000

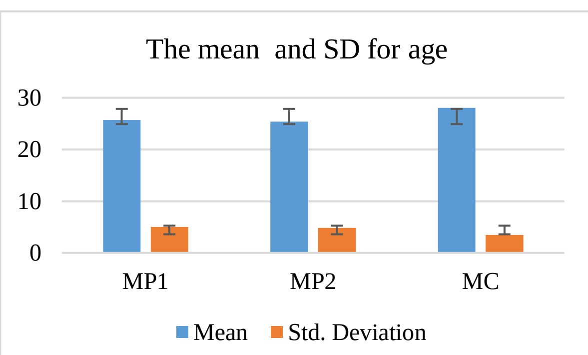

Figure 1. The mean for age levels in men

The research that we conducted on a group of men found that male fertility begins at an early age of 11-13 years, according to the questionnaire that we conducted, while it appears to decline or, so to speak, begins to decrease from the age of 76 and above. the average age of male infertility in our study, was approximately 28 to 35 years, and the poor quality of the sperm was a major factor, and reason, according to the interpretation of the results of the questionnaire, the exposure of most men with infertility in this age to the gases of the battles that took place in Iraq, and the men were severely beaten in his back area during childhood or younghood period, and also, the late of men in performing a sperm examination and quality test for semen. The study concluded that the exposure of most men at this age to environmental conditions, as shown in Table 1 and Figure 1.

The study of weight in an infertility

To understand the association between obesity in men, levels of male fertility divisions were divided into. Where L1C = 20%, L2P = 20%, and L3P = 24%, the findings of the three levels showed that there was no statistical difference between the first and second levels. The largest differences were discovered at the third level, however there were statistically significant changes at the first and third levels as well.

The metabolism of various significant components involved in the development or function of sperm in males, such as zinc, phosphorous, and magnesium, may have an impact on the excess weight with sperm parameters. According to the statistical findings of our study, there was a negative correlation between weight gain and body mass index on the one hand and sperm activity (efficacy) or total sperm count (total number) on the other as in Table 2 and Figure 2.

Table 2. The Mean+SD for weight in study effect of phytic acid with infertility men

Weight					
		MP1	MP2	MC	Total
N	-	35	35	35	105
Mean	-	80.907	82.648	91.375	81.94
Std. Deviation	-	7.9988	5.9665	7.9719	8.170
Std. Error	-	2.065	1.540	2.058	0.943
95% Confidence Interval for Mean	Lower Bound	75.703	79.895	86.118	80.066
	Upper Bound	84.5629	86.5042	94.9481	83.8265
P-value	-	0.001	0.071	0.001	

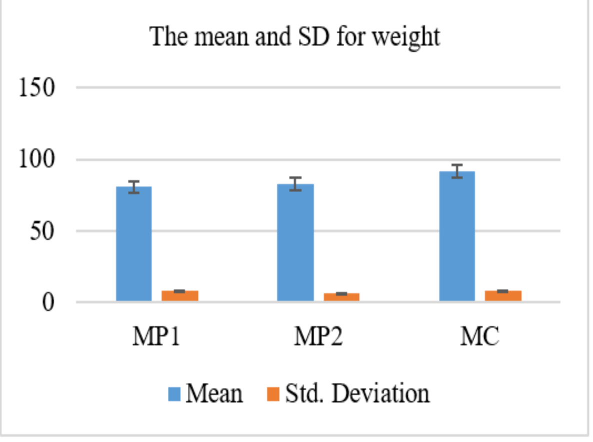

Figure 2. The mean for weight levels in men

Body Mass Index

Men with a BMI under 20 are infertile, as are those with digestive or eating disorders like anorexia nervosa or bulimia nervosa. Infertility is also more common in persons who follow strict diets and have historically relied heavily on plant-based foods. Weight increase with a BMI of 25 to 30 also had a significant and immediate impact. Men tend to eat poorly, which contributes to weight gain. This is problematic because males's weight affects the quantity, quality, and form of sperm as they travel to fertilize eggs. This also has an impact on testosterone and inhibin B levels, which can lead to early onset infertility in men. Infertility in men is more prevalent in obese men with a BMI of 30 or above, who don't exercise, and aren't in good health, according to the findings of this study (Figure 3 and Table 3).

Table 3. The Mean+SD for BMI in study effect of phytic acid with infertility men

Body Mass Idex					
		MP1	MP2	MC	Total
N	-	35	35	35	105
Mean	-	25.859	27.758	28.568	27.395
Std. Deviation	-	6.758	6.4647	8.749	7.3239
Std. Error	-	0.5784	0.7482	1.0784	0.801667
95% Confidence Interval for Mean	Lower Bound	17.0364	21.759	22.7482	20.51453
	Upper Bound	26.758	28.684	30.3689	28.60363
P-value	-	0.001	0.071	0.001	

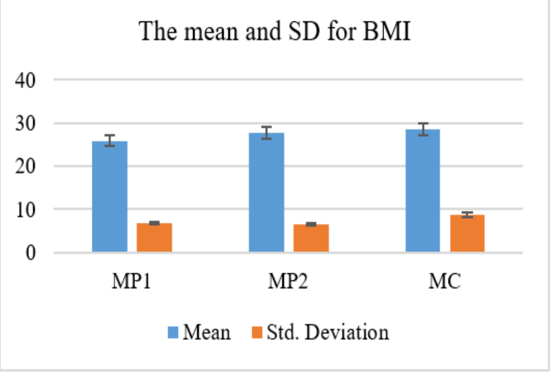

Figure 3. The mean for BMI levels in men

The total sperm in the study

The number of sperms (TS) was normal in the first level, which represents the control group, while it was the same, that is, in the normal level in the second level, but the problem was in the third level of the study, where the number of sperms was very low, and it is considered one of the problems of infertility, which we will talk about later on its relationship to phytic acid deficiency, these results are shown in Table 4 and Figure 4.

Table 4. The Mean+SD for (TS) in study effect of phytic acid with infertility men

Total sperm					
		MP1	MP2	MC	Total
N	-	35	35	35	105
Mean	-	123.86	75.400	32.933	48.053
Std. Deviation	-	12.33385	18.13757	7.18597	47.52379
Std. Error	-	3.184	4.683	1.855	5.487
95% Confidence Interval for Mean	Lower Bound	117.0364	65.3557	28.9539	37.1191
	Upper Bound	130.6969	85.4443	36.9128	58.9876
P-value	-	0.001	0.041	0.000	

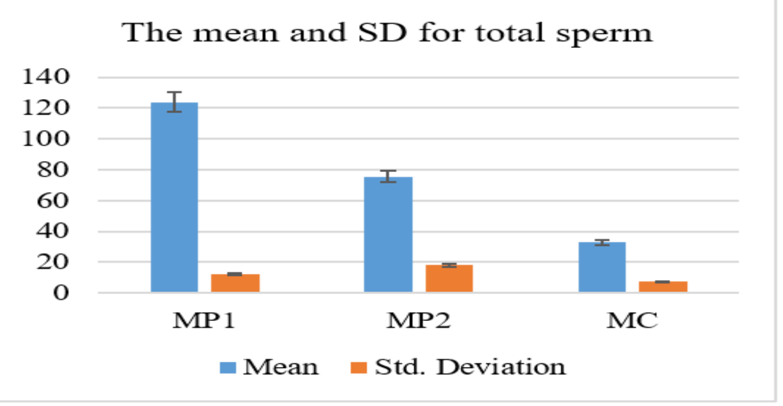

Figure 4. The mean for TS levels in men

Morphology of sperm (MS)

The results of the microscopic shape of the sperm indicated a normal shape in the first and second levels, while it decreased to lower levels in the third level, which indicates changes in the shape of the sperm, which is one of the most important causes of infertility problems.

Table 5. The Mean+SD for (MS) in study effect of phytic acid with infertility men

		MP1	MP2	MC	Total
	-	35	35	35	105
	-	81.000	78.866	62.533	58.506
	-	8.70140	9.50839	10.99913	31.69038
	-	2.246	2.455	2.839	3.659
	Lower Bound	76.1813	73.6011	56.4422	51.2154
	Upper Bound	85.8187	84.1322	68.6245	65.7980
	-	0.000	0.000	0.000	0.000

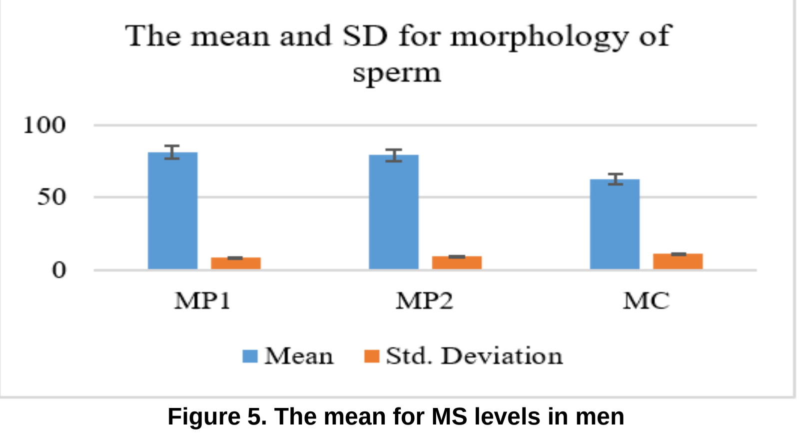

Figure 5. The mean for MS levels in men

Active of sperm

The activity sperm (AS) or actual movement of sperm was strong in the first level and began to decrease in the second level, but the third level, which represents men without sperm, was zero activity, which is the important thing that most studies are looking at for its causes in order to treat infertility.

Table 6. The Mean+SD for (AS) in study effect of phytic acid with infertility men

Active sperm					
		MP1	MP2	MC	Total
N	-	35	35	35	105
Mean	-	76.000	69.866	.0000	55.533
Std. Deviation	-	13.90786	7.81817	.00000	30.88266
Std. Error	-	3.590	2.018	.0000	3.566
95% Confidence Interval for Mean	Lower Bound	68.2981	65.5371	.0000	48.4279
	Upper Bound	83.7019	74.1962	0.0000	62.6388
P-value	-	0.000	0.000	0.000	0.000

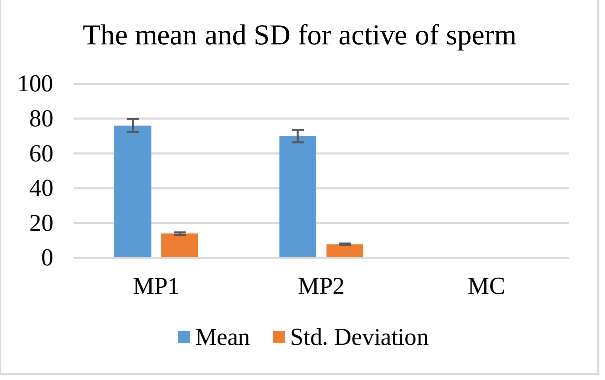

Figure 6. The mean for AS levels in men

The phytic acid in study

Recent research has concentrated on PA (Myo-inositol) as a dietary disruptor that interferes with human nutrition since phytates cannot be utilised effect on sperm parameters in our investigation. The phytic acid affect in the third level (L2P) more greatly, where phytic acid levels climbed to their highest levels, where phytic acid levels climbed to their highest levels, followed by the third level (L3P), and then the first level (L1C), statistical analysis and sample results (L1C = 11%, L1P = 32%, L2P = 25%, and L3P = 21) revealed significant differences in means across groups (L1C).

Table 4. The Mean+SD for phytic acid with infertility men

Phytic acid					
		MP1	MP2	MC	Total
N	-	35	35	35	105
Mean	-	26.503	62.226	49.774	46.167667
Std. Deviation	-	10.6485	8.5858	5.5578	8.2640333
Std. Error	-	2.174	1.071	2.062	1.769
95% Confidence Interval for Mean	Lower Bound	17.4742	48.465	41.969	35.9694
	Upper Bound	29.4743	64.3637	55.4573	49.7651
P-value	-	0.001	0.001	0.001	0.001

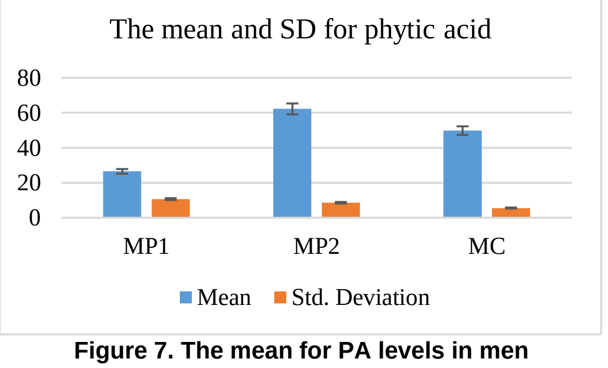

Figure 7. The mean for PA levels in men

Discussion and Conclusion

Conclusion

Infertility and its problems are among the things that many studies are looking for in finding a solution to it, whether by early detection and identifying the disease and the type of problem or in following up on patients during treatment.

the average age of male infertility in our study, was approximately 28 to 35 years, and the poor quality of the sperm was a major factor, and the reason, for the exposure of most men with infertility at this age to the more concentration of phytic acid from plant food. The study concluded that the exposure of most men at this age to environmental conditions.

the findings of the three levels showed that there was no statistical difference between the first and second levels. The largest differences were discovered at the third level, however, there were statistically significant changes at the first and third levels as well. The metabolism of various significant components involved in the development or function of sperm in males, such as zinc, phosphorous, and magnesium, may have an impact on the excess weight of sperm parameters.

Men with a BMI under 20 are infertile, as are those with digestive or eating disorders like anorexia nervosa or bulimia nervosa. Infertility is also more common in persons who follow strict diets and have historically relied heavily on plant-based foods. Weight increase with a BMI of 25 to 30 also had a significant and immediate impact. Men tend to eat poorly, which contributes to weight gain.

the number of sperms was very low, and it is considered one of the problems of infertility, which we will talk about later on its relationship to phytic acid deficiency. The activity or actual movement of sperm was strong in the first level and began to decrease in the second level, but the third level, which represents men without sperm, was zero activity.

Recent research has concentrated on PA (Myo-inositol) as a dietary disruptor that interferes with human nutrition since phytates cannot be utilized effect on sperm parameters in our investigation. The phytic acid affect in the third level (L2P) more greatly, where phytic acid levels climbed to their highest levels.

Discussion

According to research from the National Institutes of Health, men (on average) begin generating sperm between the ages of 12 and 15 throughout puberty. The average male's position within this range relies on a number of variables, including when puberty started and how rapidly each stage of adult male growth is completed [12].

This study included a total of 274 males with normozoospermia. Their body mass index (BMI, expressed in kg/m^2) ranged from 17 to 39. According to BMI, the obese group's sperm count declined over time in a consistent manner. We come to the conclusion that, in cases of normozoospermia, obesity is linked to a lower sperm count [13].

According to a recent study that was just published in the journal Andrology, the phytate acid, which is included in many plant diets, may be extremely important for fertility. Zinc, calcium, magnesium, and iron are all bound by phytic acid. Poor body absorption results from this. Infertility is more prevalent in men who have low levels of these crucial minerals [14].

Since 1963, when numerous scientists first highlighted zinc's clinical significance, its significance has grown significantly. Numerous studies on humans and animals have also been undertaken in an effort to identify inhibitors or substances that hinder the absorption of zinc. Some of these studies and trials have led researchers to the conclusion that phytate acid inhibits the body's ability to absorb and use zinc [15].

The study's main goal was to learn more about how to identify phytate acid and its derivatives Myo-inositol (MI) (PI, PIP, GPI, and IPG) in human tissues, particularly those of males, as well as body fluids like men's semen. Studying the effects of phytate acid on sperm will help us better understand the processes of the male reproductive system. According to the study's findings, sperm parameters decreased in subjects who consumed plant food supplements high in phytate acid, while sperm parameters improved in subjects with low levels of phytate acid [14].

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