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Effects Of Smoking on Men Fertility in Kirkuk City-Iraq

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Abstract

Introduction And Aim

Numerous studies have identified the effect of tobacco smoking on male fertility where seminal fluid quantity and quality were investigated in different studies including patients with a history of infertility with conflicting results. Although there was much data on infertility in other countries, little exist on infertility in Iraq, especially in Kirkuk city. To study the effects of cigarette smoking on the seminal fluid quality in infertile male smokers in comparison with nonsmokers in Kirkuk city-Iraq. A review study of 250 infertile couples with the malefactor of infertility smokers and nonsmokers from January 2015-September 2018.

Materials And Methods

Samples of 250 including the smoker and nonsmoker males with abnormal semen fluid analysis. The analysis was carried in Azadi teaching hospital –infertility consultant center, private clinics, international IVF center.

Results

The results showed that majority of infertile at age 26- 35 years and 85.6% of them have primary infertility, and about 65.6% of patients had a history of infertility period between one and five years. About 144 (57.6%) nonsmokers and about 106 (42.4%) were smokers. The majority of sperms abnormalities in total were azoospermia with 85(34%) infertile. High percentages of Oligoasthenoteratospermia, asthenoteratospermia and Oligoteratospermia were found in smoker participants which mean that smoking has obvious teratogenicity on sperms. There was a disturbance of reproductive hormones showing an increase of FSH, LH, Prolactin hormones but there was no increase in testosterone in all cases smokers and nonsmokers.

Conclusion

Decrease sperm count and an increase in the number of morphological defects of spermatozoa is directly related to Smoking. Teratospermia showed to be higher in smokers whereas oilgo and azoospermia were higher in the non-smokers.

Keywords

Smoking and infertility; Teratospermia, Male infertility, Azoospermia, Spermatogenesis.

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World Health Organization (WHO) stated that Infertility is defined by the failure to achieve a pregnancy after 12 months or more of regular unprotected sexual intercourse. (1) Infertility is identified as a public health priority, and millions of people of reproductive age complaining of infertility in the world, this will affect their families and communities and associated with increased risk of subsequent chronic health conditions such as cardiovascular diseases (2,3,4).The percentage of Infertility worldwide affects couples at reproductive-aged is between 15-20 %.The azoospermia, oligospermia or abnormal movement (motility) or shape (morphology) can causes male who is solely responsible for 20-30% of infertility cases.(1)

One of the causes of male infertility may be the obstruction of the reproductive tract, hormonal, varicoceles, cancer, or medical treatments that impair sperm-producing cells (such as chemotherapy). (5)

Environmental and lifestyle factors such as smoking, or exposure to environmental pollutants and toxins can result in infertility by reducing the quality, quantity, and motility of semen also causing male sexual impotence. (6,7). About one third of males worldwide are smoker ,at least one type of tobacco (8). Men Unfortunately about 46% of smokers are men at age (20~39),which is considered as the most important reproductive age. (9,10)

Numerous studies were conducted to identify the relation between male infertility and smoking, with many conflicting results. Some studies said that there was a direct negative effect of smoking on male fertility and seminal fluid parameters. (13,14,15).Some other studies have found a positive effects on motility of the sperms, Third group study found no significant effects on sperm parameters[8,11] Few studies showed that there was a nuclear DNA damage in the sperm because of smoking. [12].Many other conflicting reports regarding the effects of smoking on men infertility have been reported [12,13,14].

Smoking: An Overview

Several studies on cigarette smoke showed that there are many carcinogens, mutagenic materials and very toxic chemicals compounds, these materials like the metabolites of nicotine, radioactive materials like polonium and cotinine. [16,17].Other study mentioned that the seminal fluids of smokers have a higher level of nicotine in comparison with their serum level of nicotine, this will affect the the motility of the sperms . [18,19].In smokers the sperm density is highly decreased when there is an elevated seminal cadmium.[20]. Secondhand smoke can be very harmful because it contains different compounds that affect many systems in the body. [21]. Electronic cigarettes and cigarette smoke analyses have detected carcinogens and toxicants similar to each other, although electronic cigarette has a much lower levels of these materials. [22,23].

The effects of cigarette smoking on the reproductive system of male:

Smoking and other various factors are directly inhibiting the adequate maturation of sperms .[24].Varicocele and smoking causes oligospermia ten times more than nonsmokers, but smoking alone without varicocele causing oligospermia about 5 times more than nonsmokers. [5].Heavy smoking is highly correlated with increase the percentage of abnormalities in the sperm ultrastructure. [25].One of the causes of failure of regular sexual intercourse is erectile dysfunction which is a result of modifiable risk factors of both firsthand and secondhand smoking [26,27].Nicotine stimulates the release of oxytocin, vasopressin, cortisol and growth hormone ,these will inhibit prolactine and luteinizing hormones so this will alter the hypothalamic-pituitary axis results in inferetility.[28].Smoking is known to decrease the oxygen supply to the spermatic cord in addition that the vascular blood supply in the spermatic cord is relatively insufficient.[29].

Material And Methods

The inclusion criteria in this study based on:-

Smoker and nonsmoker infertile male with primary or secondary infertility.

Smokers and nonsmokers with varicocele.

Exclusion criteria: Patients having female factors for infertility. Normal fertile male participants.

Study Design and Setting

This is a reprospective study carried out from January 2015 to September 2018. It comprised a case

record review study of a convenience sample of 250 including the smoker and nonsmoker males with abnormal semen fluid analysis. Carefully reviewing the personal medical records of these infertile couples visiting the center of infertility at Azadi teaching hospital, private clinic, and IVF center in Kirkuk city Iraq. The data was collected from medical records of these couples from the center. The Seminal analysis data were collected which show the sperms abnormalities

Results:-

The findings in table (1) indicate that nearly half (49.2%) of 250 infertile men were of age ranged between 26 and 35 years, followed by (17.6%) of age 36- 40 years, followed by (17.2%) of age ranged between 20-25 and (14.8%) of age 41-50 years while older age (⩾50years) were only (0.4%) of total infertile men.

Table 1: Distribution of age in the study participants

Age/years	Infertile No.	Infertile %	Age/years	Infertile No.	Infertile %
Below 20	2	0.8	36-40	44	17.6
20-25	43	17.2	41-45	27	10.8
26-30	68	27.2	46-50	10	4
31-35	55	22	51-55	1	0.4

Table 2. Data about Type, Duration of Infertility and Seminal parameters

Parameters		Number	Percentage
Type of Infertility	Primary	214	(85.6)
	Secondary	36	(14.4)
Duration of Infertility years	1-5	164	(65.6)
	6-10	59	(23.6)
	⩾10	27	(10.8)

Table (2) represent that 85.6 % of total infertile men complained from primary infertility and the rest (14.4%) complained from secondary infertility. About 65.6% of these infertile men had infertility duration about one to five years. This percentage decreased with increasing the infertility years, so that, patients who had infertility duration between 6 and 10 years, were found in 23.6% and those with infertility duration more than10 years were found in a percentage equal to 10.8% of total infertile men.

Table 3. Number of smokers and nonsmokers with primary or secondary infertility

Social Hx	No.	%	Primary infertility	Secondary infertility
Non smoker	144	(57.6)	123	21
Smoker	106	(42.4)	91	15
Total	250	(100)	214	36

The results of Table 3 showed that in nonsmoker 144 participants there were 125 have primary infertility which equals 85.4% and (14.6%) have secondary infertility, while in smokers surprisingly primary infertility seems to be (85.8%), and secondary infertility was (14.2%) which are approximately similar to nonsmokers' participants which means that smoking has no effects on the type of infertility. All the 250 infertile participants with abnormal sperms were about 3/5 (57.6%) nonsmokers and about 2/5 (42.4%) were smokers. The majority of sperms abnormalities in total were azoospermia with 85(34%) infertile. **The table 4** showed the percentages of sperms abnormalities in nonsmokers were azoospermia (65.9%), Oligoasthenospermia (74.1%) only while the abnormalities in smokers were oligospermia (83.4%), Oligoteratospermia (60%), asthenoteratospermia (57.2%), Oligoasthenoteratospermia(55.9%) asthenospermia (51.3%) seems to be significantly higher than nonsmokers. These

results were terato group of sperm abnormality as Oligoasthenoteratospermia asthenoteratospermia and Oligoteratospermia were found in smoker participants which means that smoking has obvious teratogenicity on sperms.

Table 4: percentages of sperms abnormalities in smoker and nonsmoker participants

Types of sperms abnormalities	Total of sperms abnormalities		Nonsmoker sperms abnormalities		Smoker sperms abnormalities	
	No.	%	No	%	No.	%
Asthenospermia	39	15.6%	19	(48.7)	20	(51.3)
Azoospermia	85	34%	56	(65.9)	29	(34.1)
Oligospermia	18	7.2%	3	(16.6)	15	(83.4)
Oligoasthenospermia	62	24.8%	46	(74.1)	16	(25.9)
Oligoasthenoteratospermia	34	13.6%	15	(44.1)	19	(55.9)
Asthenoteratospermia	7	2.8%	3	(42.8)	4	(57.2)
Oligoteratospermia	5	2%	2	(40)	3	(60)
Total	250		144		106	
Percentage			57.6%		42.4%	

Table 5: Effects of varicocele with smoking on sperms abnormalities

		smoker		Nonsmokers	
Types of sperms abnormality	Total	No varicocele	With varicocele	With varicocele	No varicocele
Asthenospermia	39	15	5	4	15
Azoospermia	85	24	5	13	43
Oligospermia	18	12	3	2	1
Oligoasthenospermia	62	7	9	8	38
Oligoasthenoteratospermia	34	14	5	8	7
Asthenoteratospermia	7	3	1	1	2
Oligoteratospermia	5	2	1	0	2
		77	29	36	108
Total	250	106		144	
Percentage	100%	42.4%		57.6%	

Table 5 showed the combination of smoking and varicocele effects on sperms abnormalities in comparison with nonsmokers. In all 250 infertile males the total sperms abnormalities with azoospermia were 85 patients with 24 were smokers alone and 5 were smokers with varicocele, the second sperm abnormality was oilgoasthenospermia 62 patients with 7 smokers alone and 9 smokers with varicocele, then the Asthenospermia, Oligoasthenoteratospermia, oligospermia and asthenoteratospermia, Oligoteratospermia were 39,37,21,7 and 2 respectively. The nonsmokers with sperms abnormalities form 57.6% of patients while smokers (alone or with varicocele) have 42.4% which is a high percentage.

Table 6: percentages of sperms abnormalities

Types of sperms abnormality	Total	No varicocele	Varicocele	Percentage Of effects of varicosity on sperms abnormality
Asthenospermia	39	27	12	30.7%
Azoospermia	85	63	21	24.7%
Oligospermia	18	16	5	27.7%
Oligoasthenospermia	62	43	17	27.4%
Oligoasthenoteratospermia	34	24	13	38.2%
Asthenoteratospermia	7	5	2	28.6%
Oligoteratospermia	5	1	1	20%
Total	250	179	71	
Percentage		71.6%	28.4%	

Table 6 showed that a large percentage of sperm abnormalities in participants with varicocele found as Oligoasthenoteratospermia 38.2%, followed by asthenospermia 30.7%,asthenoteratospermia28.6%, and oligospermia 27.7%. When there was no varicocele the major sperm abnormality was found as azoospermia followed by oligpasthenospermia. The total sperms abnormalities with varicocele were 71 (28.4%), while males without varicocele have 179 (71.6%) abnormalities.

Table 7 showed that the disturbance of reproductive hormones showing an increase of FSH, LH ,Prolactin hormones but there is no increase in testosterone in all cases smokers and nonsmokers. There are slight differences in the increase, decrease, or normal of FSH both in smokers and nonsmokers, but LH and prolactin were more increased in nonsmokers, while testosterone more decrease in nonsmokers than the smokers.

Table 7: Reproductive hormones abnormalities

	FSH			LH			Testosterone			Prolactin		
	Inc.	Dec	Nor	Inc.	Dec	Nor	Inc.	Dec	Nor	Inc.	Dec	Nor
Smoker 106 (42.4)%	39	8	59	28	4	74	0	79	27	12	0	94
	36.8%	7.5%	55.7%	26.4%	3.8%	69.8%		74.5%	25.5%	11.3%		88.7%
Nonsmoker 144 (57.6)%	54	11	79	49	11	84	0	116	28	32	4	108
	37.5%	7.6%	54.9%	34%	7.6%	58.3%		80.5%	19.4%	22.2%	2.8%	75%

Discussion

A healthy lifestyle, healthy food is responsible for producing healthy sperm and decreasing the infertility in men. Some bad lifestyle choices found to have bad effect on sperms parameters like exposure to environmental hazards, Smoking, chronic alcohol abuse, and toxins, anabolic steroid , intense exercise causes a testosterone deficiency all these resulting in decreases the sperm count and motility .Oligospermia found in patients with inadequate zinc and vitamin C in their food ,Wearing tight clothes causing elevated the temperature of the scrotum, as the varicocele , this will result in decreased the sperms motility and production, [30]

The alterations in the level of the reproductive hormones lead to abnormal spermatogenesis and this will lead to infertility, because formation of sperms is a complex process and depends on the proper functions of these hormones.

In the present study nearly half (49.2 %) of total infertile men were of age ranged between 26 and 35 years, followed by (17.6%) of age 36- 40 years, and (17.2%) of age 20- 25 years, these findings may be related to late marriage age of men in Kirkuk and/or Iraq as a general to be around thirties, the causes are many and especially the civilian war and economic situation. Also Bhale *et al.* found that most of the infertile men in the age group of 25-40 years, these results are very close to our findings [31], but our findings (27.2% at age 26-30) is not that close with Gangwar *et al.* who found that the majority of these infertile male (40%) their age in the range of 26-30 years [30,32].

In our results, about 65.6% of infertile men had a history of infertility range between 1 and 5 years. The majority was 19.5% patients had infertility duration of 2 years. This percentage decreased with increasing the infertility years as 23.6% in duration of 6 and 10 years, and 10.8% above 11 years duration, so that, The decrease in the percentage of infertile men with the increasing in the duration of infertility could be due to the increase in awareness of the man as a cause of infertility and the earlier interest in seeking advice, or as Kidd *et al.* found that the time to pregnancy increased with the male age and there is an association between increased age of male and increased time to achieve pregnancy and the frequency of subfecundity [33].

The primary infertility prevalence was high in Kirkuk region (85.6%), which is supported by similar findings of Öztekin *et al* [34] but differed from study conducted by Nwajiaku *et al* in South East Nigeria [35]. This high frequency of primary infertility could be due to hidden genetic defects, many of idiopathic azoospermia, or oligospermia have a genetic basis. Dohle *et al.*, found that infertile men have an

approximately 10-folds increase in the incidence of chromosomal anomalies compared with normal controls [36] Another explanation for the predominance of primary infertility in this study could be attributed to the high cost of infertility treatment programs, the prolonged follow up periods, and the discouraging success pregnancy rate. These make patients with primary infertility seek medical help more promptly than those who have already conceived particularly when the male factor is the cause of infertility problem in the couple.

Most common infertile group was azoospermia (34%) followed by oilgoasthenospermia (24.8%) and Asthenospermia (15.6), while Oligoasthenoteratospermia (13.6%), oligospermia (7.2%) asthenoteratospermia (2.8%) , and the last abnormality was oilgoteratospermia(2%).These results are partially similar to that reported by Gangwar *et al.* [32]. In contrast Öztekin *et al*, Karabulut *et al* found other percentages of sperms abnormalities. [34,37] .The discrepancy between the incidence in our results and in others may be due to geographic, environmental, socioeconomic, racial differences, smoking, radiation exposure stress, and ethnicity, season of sample collection, varicocele, infection and genital abnormalities.

The review of the following literatures Hoidas *et al.* [38], De Mouzon *et al.* [39], Goverde HJ *et.al* [40], Dunphy BC *et al.* [41] found a contradictory result some of these studies have reported a bad effects of smoking on the seminal fluid analysis parameters and male infertility other researchers have found there is no negative effects on semen parameters, and in some other cases, have even found positive impact on the sperm motility. Other inconsistent and conflicting data regarding the influence of smoking on male infertility have been reported .The current study showed the impact of smoking on the seminal fluid analysis parameters. The smokers were using more than 20 cigarettes per day for more than one year. Although smoking has no effects on the type of infertility primary or secondary , But teratospermia group of sperm abnormality was noted as Oligoasthenoteratospermia, asthenoteratospermia and Oligoteratospermia found in smoker participants while azoospermia and oilgoasthenospermia were double and three times increase respectively in nonsmokers more than smokers this mean smoking has obvious teratogenicity on sperms, These results were close to the study of Meri ZB et al. cigarette smoking affect seminal fluid parameters.[42]

Infertile with varicocele were smokers (42.4%) and nonsmokers(57.6%), the sperms abnormalities showed no much differences between 2 groups like in asthenospermia the result of smokers with varicocele was (25%) while nonsmokers with varicocele the result was (21%), but with azoospermia (17%) and (23.2%) respectively. There is much difference in oilgoasthenospermia as (56%) and (17%) respectively.

So there are effects of varicocele with smoking but only with some types of sperms abnormalities, our results are supported by a study of El Mulla. *et al.* The effects of smoking and varicocele on human sperms [43].

Pasqualotto *et al.* [44], Rybar *et al.* [45] evaluated the semen quality and hormonal levels in smokers and nonsmokers, their results showed that the differences are not significant among these groups in the sperm analysis regarding motility, concentration, the levels of serum testosterone, FSH, LH, or sperm motion characteristics. In the current study, there was a disturbance of reproductive hormones showing an increase of FSH, LH, Prolactin hormones but there was no increase in testosterone in all cases smokers and nonsmokers.

There are slight differences in the increase, decrease, or normal of FSH both in smokers and nonsmokers, but LH and prolactin were more increased in nonsmokers, while testosterone more decrease in nonsmokers than the smokers. this result is supported by the findings of Gangwar *et al.* [31] but is not supported by a study conducted in Taiwan (Jeng HA .*et al*) that showed non-significant difference in the levels of FSH and LH between non-smokers and smokers and showed that the effect of smoking is higher on semen compared to the hormones production that were involved in the functioning of the reproductive system of male. [46]

Conclusions

In conclusion, regarding sperm analysis parameters, our stydy showed that smoking was associated with an increase in the number of morphological defects of spermatozoa and a lower sperm count. Results of our analysis showed a higher

percentage of teratospermia in smokers whereas oilgospermia and azoospermia were higher in the non-smokers. Nevertheless, major evidences point to the fact that infertile men, or those waiting long for conceiving, should quit any type of smoke to reach optimize their chances for successful conception.

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