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ASSOCIATION OF WEIGHT AND LIFESTYLE IN MEN WITH SECONDARY INFERTILITY/ BAGHDAD 2024

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ABSTRACT

Background: Secondary male infertility occurs when a father, after previously conceiving naturally, experiences reproductive health issues that prevent further conception. **Aims of Study:** This study aims to assess the effect of lifestyle factors on sperm quality in secondary infertile men and determine the association between seminal fluid indicators and sociodemographic characteristics. **Methods:** A descriptive cross-sectional study was conducted on 150 males with secondary infertility at the Urological Outpatient Clinic of Baghdad Teaching Hospital/Medical City and the High Institute for Infertility Diagnosis and Assisted Reproductive Technology/Al-Nahrain University. The study period was from February 1 to August 31, 2024, using a convenience sampling method. **Results:** Abnormal sperm morphology was significantly associated with older age (44.8%), obesity (54%), longer marriage duration (42.1%), and previous mumps infection (71.4%). Low pH levels were more prevalent among obese men (64.3%), military personnel (92.9%), and workers such as bakers, drivers, and farmers (92.7%). Low sperm count was significantly higher in men with varicocele (37%). Active sperm count declined with age, while mildly immotile sperm increased. **Conclusion:** Factors predicting poor seminal fluid quality in secondary infertile men included advanced age, high BMI, alcohol consumption, military or baking occupations, diabetes mellitus, varicocele, mumps history, prior surgeries, and longer infertility duration. Addressing these risk factors could improve reproductive outcomes in affected individuals.

KEYWORDS: Association, Weight, Lifestyle, Men, Secondary Infertility.

INTRODUCTION

Infertility is a disease of the male or female reproductive system, defined by the failure to achieve pregnancy after 12 months or more of regular unprotected sexual intercourse. It can be attributed to male, female, or unexplained factors.[1] Primary infertility refers to couples who have never conceived despite one year of unprotected intercourse.[2] Secondary infertility occurs when parents fail to conceive again after a previous natural conception and childbirth, without the use of assisted reproductive technologies or fertility medications.[3] Unexplained infertility is diagnosed when no identifiable cause is found despite thorough testing.[4] Male infertility results from factors affecting sperm production, seminal fluid, or reproductive organs.[5] The prevalence of pure male factor infertility ranges from 2.5% to 12%.[6] In Iraq, secondary infertility is less common than primary infertility but still affects many couples. A study in Kirkuk found that 14.4% of infertile men had secondary infertility.[7] In another Iraqi study, 21.7% of infertile men had secondary infertility, with 61.1% diagnosed with asthenospermia and 38.9% with oligoasthenospermia.[8] Semen is the fluid containing sperm, secreted by the prostate, seminal vesicles, and testicles.[9] The WHO 2021 reference values for semen analysis include a minimum volume of 1.4 ml, total sperm count of 39 million, and progressive motility of 30%.[10] Epidemiologically, male factor infertility in secondary infertility cases varies worldwide, with the highest prevalence in Central/Eastern Europe (10.03%) and North Africa/Middle East (4.32-5.04%).[11] In Iraq, a study in Al-Anbar found that 38% of infertile men had secondary infertility, with male factors responsible in 17%.[12] Another study showed fluctuations in secondary infertility rates in men, ranging from 4.4% to 37.3% between 2014 and 2018.[13] The etiology of secondary male infertility includes endocrinological disorders (iron overload syndrome, hyperthyroidism), environmental toxins, immunological diseases, malignancies, medication use, sexual dysfunction, and infections.[14] Chronic diseases such as diabetes, cardiovascular diseases, autoimmune disorders, and high ambient temperature exposure also contribute.[15] Lifestyle factors significantly impact male infertility. A Mediterranean diet improves sperm quality, whereas processed food diets negatively affect it.[16] Regular physical activity is beneficial, while a sedentary lifestyle contributes to obesity and infertility.[17] Smoking, excessive alcohol, poor sleep, and high stress levels impair sperm production.[17] Obesity is increasingly recognized as a risk factor. Overweight and obesity rates are rising, with global adult obesity doubling from 7% to 16% between 1990 and 2022.[18] Obesity disrupts the hypothalamic-pituitary-gonadal axis, leading to hormonal imbalances, increased estrogen, and reduced testosterone.[19] It negatively affects spermatogenesis, sperm quality, and sperm DNA integrity, increasing oxidative stress and apoptosis.[28] Obese men are also at a higher risk of erectile dysfunction.[20] Management of obesity-related male infertility involves lifestyle changes, pharmacological treatment, and surgery.[21] The study aims to evaluate the impact of lifestyle factors on sperm quality in men with secondary infertility. Additionally, it seeks to determine the association between seminal fluid parameters and sociodemographic characteristics.

METHOD

A descriptive cross-sectional study with analytic elements was conducted from February 1 to August 31, 2024, during working hours. The study was carried out at the Urological Outpatient Clinic of Baghdad Teaching Hospital/Medical City and the High Institute for Infertility Diagnosis and Assisted Reproductive Technology/Al-Nahrain University, which provide infertility diagnosis and treatment services. The study included 150 males diagnosed with secondary infertility attending the above-mentioned clinics. A convenience sampling method was used, and data collection was based on patient consent and inclusion criteria.

Inclusion Criteria

1. Males aged 30 years or older.
2. History of at least one successful pregnancy with the same partner.
3. Female partner free of infertility causes.

Exclusion Criteria

1. Patients with congenital or genetic reproductive disorders.
2. Those who refused to participate.

A pilot study was conducted on 20 participants to assess the questionnaire's applicability, identify unclear questions, and resolve technical issues. Modifications were made accordingly, and pilot study participants were excluded from the final analysis. Data was collected through researcher-administered questionnaires after infertility diagnosis. Additional information (age, weight, number of children, job) was obtained from patient records. The questionnaire, reviewed by experts, consisted of six sections.

1. Sociodemographic data (age, smoking, alcohol use, education, occupation).
2. Medical history (surgical history, diabetes, STDs, mumps, varicocele).
3. Reproductive history (marital duration, number of children, infertility duration).
4. Environmental factors (trauma, heat exposure).
5. Anthropometric data (height, weight, BMI classification per WHO).
6. Semen analysis (volume, sperm count, motility, pH, morphology).

Ethical Considerations: The study was approved by the Ethical and Scientific Committee of the Iraqi Board for Medical Specialization. Permissions were obtained from the Medical City Health Directorate and Al-Nahrain University. Verbal consent was taken after explaining study objectives and ensuring data confidentiality. Statistical Analysis: Data was entered into Microsoft Excel 2016 and analyzed using SPSS version 26. Descriptive statistics were presented in tables and graphs. Chi-square tests were used for categorical associations, with p-values < 0.05 considered statistically significant.

RESULTS

Table (1) shows that 92 (61.3%) of patients were aged 30 years or less. Among them, 66 (44%) had primary education, 57 (38%) had secondary education, and 27 (18%) had university-level education. 118 (78.7%) were smokers, and 24 (16%) consumed alcohol. Regarding employment, 28 (19%) were military personnel, 33 (22%) office workers, 48 (32%) general workers, and 41 (27%) bakers, drivers, or farmers. Weight distribution was 16% normal, 46.7% overweight, and 37.3% obese. 31 (20.7%) were infertile for 5 years or more, and 93 (62%) had been married for less than 10 years. Table (1) highlights medical histories: 27 (18%) had diabetes mellitus, 43 (28.7%) had undergone pelvic surgery, and 29 (19.3%) had experienced pelvic accidents. Additionally, 3 (2%) had STDs, 7 (4.7%) had mumps, 77 (51.3%) had testicular pain, 57 (38%) had varicocele, and 14 (9.3%) had prolonged heat exposure.

Table 1: Distribution of studied cases according to sociodemographic variables Distribution of studied cases according to medical history (total no. 150).

		No.	%
Age (years)	≤ 30 year	92	61.3
	> 30 year	58	38.7
Education	Primary	66	44.0
	Secondary	57	38.0
	University	27	18.0
Number of children	One	96	64.0
	Year > 2	54	36.0
Marital duration	Year < 10	93	62.0
	Year ≥ 10 year	57	38.0
Smoking	Yes	118	78.7
	No	32	21.3
Alcohol	Yes	24	16.0
	No	126	84.0
Job	Military	28	19
	Govermental	33	22
	Non govermental	48	32
	Baker, driver, farmer	41	27
BMI	Normal	24	16.0
	Overweight	70	46.7
	Obese	56	37.3
Infertility/duration years	Year ≤ 5	119	79.3
	Year > 5	31	20.7
		No.	%
DM	Yes	27	18
	No	123	82
PelvicSurgery	Yes	43	28.7
	No	107	71.3
PelvicAccident	Yes	29	19.3
	No	121	80.7
STD	Yes	3	2.0
	No	147	98.0
MUMPS	Yes	7	4.7
	No	143	95.3
Testicular pain	Yes	77	51.3
	No	73	48.7
Varicocele history	Yes	57	38.0
	No	93	62.0
ProlongHeat exposer	Yes	14	9.3
	No	136	90.7

Figure (1) displayed that 39 (26%) of studied patients had low seminal fluid volume, 125 (83%) had low sperm count, the shape of sperms of 48 (32%) was abnormal, and low PH was found in 113 (75%) of patients.

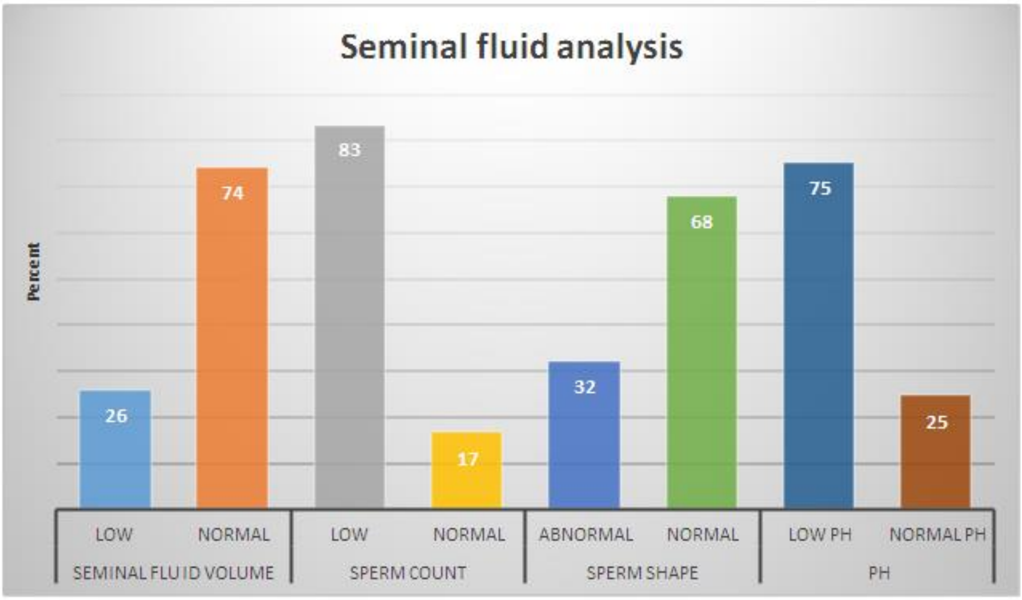

Figure (1): Distribution of studied cases according to seminal fluid analysis.

Table (2) shows that **seminal fluid volume** and **sperm count** were similar across age groups, with no significant differences (**P = 0.976, P = 0.764**). However, **abnormal sperm shape** was significantly higher in older men (**44.8% vs. 23.9%, P = 0.007**), indicating a correlation between age and sperm morphology. **pH levels** were mostly normal in both groups (**76.1% vs. 74.1%**) with no significant difference (**P = 0.787**).

Table 2: Association between seminal fluid indicators and age (total no. 150).

Seminal fluid indicators		Total	Age				P value
			≤ 30 year		>30 year		
			N = 92	%	N = 58	%	
Seminal fluid volume	Low	39	24	26.1	15	25.9	0.976
	Normal	111	68	73.9	43	74.1	
Sperm count	Low	125	76	82.6	49	84.5	0.764
	Normal	25	16	17.4	9	15.5	
Sperm shape	Abnormal	48	22	23.9	26	44.8	0.007
	Normal	102	70	76.1	32	55.2	
PH	Low PH	113	70	76.1	43	74.1	0.787
	Normal PH	37	22	23.9	15	25.9	

Table (3) shows that seminal fluid volume, sperm count, sperm shape, and pH levels did not differ significantly across educational backgrounds (P > 0.05 for all parameters). Low seminal fluid volume was observed in 25.8% (primary), 28.1% (secondary), and 22.2% (university) educated individuals (P = 0.848). Low sperm count was slightly more common in men with higher education (77.3%, 87.7%, 88.9%, respectively; P = 0.209). Abnormal sperm shape appeared in 33.3% (primary), 35.1% (secondary), and 22.2% (university) without significant differences (P = 0.475). Low pH was most common in primary education holders (78.8%), compared to secondary (75.4%) and university (66.7%) groups (P = 0.469). Overall, education level showed no significant impact on seminal fluid parameters.

Table 3: Association between seminal fluid indicators and education (total no. 150).

Seminal fluid indicator		Total no.	Education						P value
			Primary N=66		Secondary N= 57		University N=27		
			No.	%	No.	%	No.	%	
Seminal fluid volume	Low	39	17	25.8	16	28.1	6	22.2	0.848
	Normal	111	49	74.2	41	71.9	21	77.8	

Sperm count	Low	125	51	77.3	50	87.7	24	88.9	0.209
	Normal	25	15	22.7	7	12.3	3	11.1	
Sperm shape	Abnormal	48	22	33.3	20	35.1	6	22.2	0.475
	Normal	102	44	66.7	37	64.9	21	77.8	
PH	Low PH	113	52	78.8	43	75.4	18	66.7	0.469
	Normal PH	37	14	21.2	14	24.6	9	33.3	

Table (4) shows that seminal fluid volume and sperm count did not significantly differ across BMI categories (P = 0.883, P = 0.987). However, sperm shape abnormalities increased significantly with BMI (17% in normal weight vs. 54% in obese, P = 0.001). Additionally, low pH levels were most common in normal-weight individuals (95.8%), decreasing significantly in overweight and obese men (P = 0.010), indicating a correlation between obesity and semen quality.

Table 4: Association between seminal fluid indicators and weight status (total no. 150).

		BMI						P value
		Normal weight (n=24)		Overweight (n=60)		Obese (n=57)		
		No.	%	No.	%	No.	%	
Seminal fluid volume	Low	7	29.2	17	24.3	15	26.8	0.883
	Normal	17	70.8	53	75.7	41	73.2	
Sperm count	Low	20	83.3	58	82.9	47	83.9	0.987
	Normal	4	16.7	12	17.1	9	16.1	
Sperm shape	Abnormal	4	17	19	27	30	54	0.001
	Normal	20	83	51	73	26	46	
PH	Low PH	23	95.8	54	77.1	36	64.3	0.010
	Normal PH	1	4.2	16	22.9	20	35.7	

Table (5) shows no significant differences in seminal fluid volume (P = 0.549), sperm count (P = 0.859), or abnormal sperm shape (P = 0.070) between smokers and non-smokers. Low pH levels were common in both groups (73.7% in smokers, 81.3% in non-smokers). Alcohol consumption showed no significant impact on seminal fluid parameters, except for a slightly lower abnormal sperm shape percentage among drinkers.

Table 5: Association between seminal fluid indicators and social habits (total no. 150).

Seminal fluid indicator		Total no.	Smoking				Alcohol			
			Yes= 118		No= 32		Yes= 24		No= 126	
			No.	%	No.	%	No.	%	No.	%
Seminal fluid volume	Low	39	32	27.1	7	21.9	7	29.2	32	25.4
	Normal	111	86	72.9	25	78.1	17	70.8	94	74.6
P value			0.549				0.700			
Sperm count	Low	125	98	83.1	27	84.4	18	75.0	107	84.9
	Normal	25	20	16.9	5	15.6	6	25.0	19	15.1
P value			0.859				0.232			
Sperm shape	Abnormal	48	42	35.6	6	18.8	4	16.7	44	34.9
	Normal	102	76	27.1	26	81.3	20	83.3	82	65.1
P value			0.070				0.079			
PH	Low PH	113	87	73.7	26	81.3	17	70.8	96	25.4
	Normal PH	37	31	26.3	6	18.8	7	29.2	30	25.4
P value			0.381				0.577			

Table (6) shows no significant differences in seminal fluid volume (P = 0.364), sperm count (P = 0.116), or abnormal sperm shape (P = 0.109) across occupations. However, pH levels were significantly lower in military personnel and bakers/drivers/farmers, with rates exceeding 90% ($P \leq 0.001$), indicating an occupational impact on semen acidity.

Table 6: Association between seminal fluid indicators and job (total no. 150).

		Total	Job								P value
			Military No.= 28		Govermental No.= 33		Non-governmental No.= 48		Baker, driver, farmer No.= 41		
			No.	%	No.	%	No.	%	No.	%	
Seminal fluid volume	Low	39	7	25.0	12	36.4	9	18.8	11	26.8	0.364
	Normal	111	21	75.0	21	63.6	39	81.3	30	73.2	
Sperm count	Low	125	27	96.4	28	84.8	36	75.0	34	82.9	0.116
	Normal	25	1	3.6	5	15.2	12	25.0	7	17.1	
Sperm shape	Abnormal	48	12	42.9	7	21.2	12	25.0	17	41.5	0.109
	Normal	102	16	57.1	26	78.8	36	75.0	24	58.5	
PH	Low PH	113	26	92.9	18	54.5	31	64.6	38	92.7	0.001
	Normal PH	37	2	7.1	15	45.5	17	35.4	3	7.3	

Table (7) shows no significant differences in seminal fluid volume (P = 0.065), sperm count (P = 0.821, P = 0.241), or pH levels across marital and infertility duration groups. However, abnormal sperm shape was significantly higher in those married ≥10 years (42.1% vs. 25.8%, P = 0.038), suggesting a correlation between longer marriage duration and sperm morphology abnormalities.

Table 7: Association between seminal fluid indicators and marital Durationandsecondary infertility duration (total no. 150)

Seminal fluid indicator			Marital duration				Secondary Infertility duration			
			< 10 year (n=93)		≥ 10 year (n=57)		≤ 5 year (n=119)		> 5 year (n=31)	
			No.	%	No.	%	No.	%	No.	%
Seminal fluid volume	Low	39	29	31.2	10	17.5	33	27.7	6	19.4
	Normal	111	64	68.8	47	82.%	86	72.3	25	80.6
P value			0.065				0.344			
Sperm count	Low	125	78	83.9	47	82.5	97	81.5	28	90.3
	Normal	25	15	16.1	10	17.5	22	18.5	3	9.7
P value			0.821				0.241			
Sperm shape	Abnormal	48	24	25.8	24	42.1	36	30.3	12	38.7
	Normal	102	69	74.2	33	57.9	83	69.7	19	61.3
P value			.038				0.369			
PH	Low PH	113	71	76.3	42	73.7	90	75.6	23	74.2
	Normal PH	37	22	23.7	15	26.3	29	24.4	8	25.8
P value			0.714				0.869			

Table (8) shows no significant differences in seminal fluid volume (P = 0.117), sperm count (P = 0.648), or pH levels across groups based on the number of children. However, abnormal sperm shape was more frequent in those with >2 children (40.7%) compared to those with one child (27.1%), though this was not statistically significant (P = 0.085).

Table 8: Association between seminal fluid indicators and number of children (total no. 150).

torSeminal fluid indica		Total	Number of children				P value
			One		<2		
			No.	%	No.	%	
Seminal fluid volume	Low	39	29	30.2	10	18.5	0.117
	Normal	111	67	69.8	44	81.5	
Sperm count	Low	125	81	84.4	44	81.5	0.648
	Normal	25	15	15.6	10	18.5	
Sperm shape	Abnormal	48	26	27.1	22	40.7	0.085
	Normal	102	70	72.9	32	59.3	

PH	Low PH	113	71	74.0	42	77.8	0.602
	Normal PH	37	25	26.0	12	22.2	

Table (9) shows no significant differences in seminal fluid volume (P = 0.337) or sperm count (P = 0.154) between diabetic and non-diabetic individuals. However, varicocele history was significantly associated with lower seminal fluid volume (P = 0.017) and lower sperm count (P = 0.013). Additionally, abnormal sperm shape was significantly higher in those with a history of mumps (P = 0.022).

Table 9: Association between seminal fluid indicators and DM, STD, Mumps and varicocele history (total no. 150)

		DM				**STD**				**MUMPS**				**Varicocele history**			
		Yes (n=27)		**No (n=123)**		**Yes(n=3)**		**No(n=147)**		**Yes(n=7)**		**No(n=143)**		**Yes(n=57)**		**No (n=93)**	
		No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Seminal fluid volume	Low	9	33.3	30	24.4	0	0.0	39	26.5	1	14.3	38	26.6	21	37	18	19
	Normal	18	66.7	93	75.6	3	100	108	73.5	6	85.7	105	73.4	36	63	75	81
p. value		0.337				0.300				0469				0.017			
Sperm count	Low	25	92.6	100	81.3	1	33.3	124	84.4	4	57.1	121	84.6	53	93	72	77
	Normal	2	7.4	23	18.7	2	66.7	23	15.6	3	42.9	22	15.4	4	7	21	23
P. value		0.154				.0.433'				0.057				0.013			
Sperm shape	Abnormal	10	37.0	38	30.9	1	33.3	47	32.0	5	71.4	43	30.1	21	36.8	27	29.0
	Normal	17	63.0	85	69.1	2	66.7	100	68.0	2	28.6	100	69.9	36	63.2	66	71.0
P. value		0.536				0.960				0.022				0.320			
PH	Low PH	24	88.9	89	72.4	3	100.	110	74.8	5	71.4	108	75.5	43	75.4	70	75.3
	Normal PH	3	11.1	34	27.6	0	0.0	37	25.2	2	28.6	35	24.5	14	24.6	23	24.7
P. value		0.071				0.317				0.806				0.981			

Table (10) shows no significant differences in seminal fluid volume, though it was slightly lower in those with prolonged heat exposure (57.1%). Sperm count was predominantly low, with pelvic surgery showing a borderline significant difference (P = 0.063). Abnormal sperm shape varied, particularly in heat-exposed individuals (P = 0.099). Low pH levels were common across all groups, but differences were not statistically significant.

Table (10): Association between seminal fluid indicators and surgery, accident, heat exposure and history of testicular pain (total no. 150)

		PelvicSurgery				**LocalAccident**				**ProlongHeat exposure**				**Testicular pain**			
		Yes (n=43)		**No (n=107)**		**Yes (n=29)**		**No (n=121)**		**Yes (n=14)**		**No (n=136)**		**Yes (n=77)**		**No (n=73)**	
		No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Seminal fluid volume	Low	14	32.6	25	23.4	7	24.1	32	26.4	6	42.9	33	24.3	16	20.8	23	31.5
	Normal	29	67.4	82	76.6	22	75.9	89	73.6	8	57.1	103	75.7	61	79.2	50	68.5
P. value		0.246				0.799				0.131				0.134			
Sperm count	Low	32	74.4	93	86.9	22	75.9	103	85.1	11	78.6	114	83.8	66	85.7	59	80.8
	Normal	11	25.6	14	13.1	7	24.1	18	14.9	3	21.4	22	16.2	11	14.3	14	19.2
P. value		0.063				0.229				0.616				0.422			
Sperm shape	Abnormal	10	23.3	38	35.5	13	44.8	35	28.9	3	21.4	45	33.1	26	33.8	22	30.1
	Normal	33	76.7	69	64.5	16	55.2	86	71.1	11	78.6	91	66.9	51	66.2	51	69.9
P. value		0.146				0.099				0.373				0.634			
PH	Low PH	32	74.4	81	75.7	18	62.1	95	78.5	12	85.7	101	74.3	59	76.6	54	74.0
	Normal PH	11	25.6	26	24.3	11	37.9	26	21.5	2	14.3	35	25.7	18	23.4	19	26.0
P. value		0.869				0.065				0.344				0.707			

Table (11) shows a significant decline in Active Sperm (%) and Normal Sperm (%) with increasing age (P = 0.0001, P = 0.0014). Immotile Sperm (%) increased slightly but significantly (P = 0.028), while Sluggish Sperm (%) showed no significant change (P = 0.343), indicating that sperm motility and morphology deteriorate with age.

Table 11: ANOVA test show sperm quality parameter and effect of age.

Sperm Quality Parameter	ANOVA Statistic	P-value	Effect
Active Sperm (%)	16.12	0.0001	Significant decrease with age
Normal Sperm (%)	10.65	0.0014	Significant decrease with age
Sluggish Sperm (%)	0.91	0.343	No significant difference
Immotile Sperm (%)	4.94	0.028	Mild increase with age

DISCUSSION

Infertility affects millions worldwide, with a high prevalence in developing countries.[11] Poor semen quality remains a critical issue in male reproductive health, and semen analysis is a key diagnostic tool.[22] In this study, most participants were under 30 years old, had limited education, and were smokers, with a significant portion being overweight or obese. Similarly, Hossain et al. in Bangladesh reported that 53.5% of their secondary infertility patients were aged 29-39 years, with 66.3% being smokers.[23] This study also found a low prevalence of STDs (2%), mumps (4.7%), and heat exposure (9.3%), while DM (18%), testicular trauma (19.3%), pelvic surgery (28.7%), varicocele (38%), and testicular pain (51.3%) were more common. Abd et al. in Iraq reported that 53.2% of secondary infertility cases were linked to factors such as trauma, surgery, varicocele, smoking, and chronic illnesses.[24] This study found a significant association between age (>30 years) and abnormal sperm shape (44.8%), aligning with Kleshchev et al., who reported increased sperm deformities in older men.[25] Kumar et al. in India similarly noted an age-related decline in sperm morphology and motility (17%) but also found reduced sperm count, which contradicts this study.[26] Higher BMI was associated with abnormal sperm shape (54% in obese, 19% in overweight individuals). Darand et al. in Iran confirmed lower normal sperm morphology in obese men (9.4%)[27], and Keszthelyi et al. in Hungary found an inverse relationship between BMI and normal sperm morphology.[28] However, Ala et al. in Pakistan only found an association between BMI and sperm motility, not morphology.[29] This study found no significant association between smoking and seminal fluid quality, contradicting the meta-analysis by Sharma et al., which linked smoking to reduced sperm count, motility, and morphology, with more severe effects in heavy smokers.[30] Regarding occupational impact, bakers and military personnel had significantly higher low sperm pH rates (92.7%), consistent with Al-Otaibi's study, which found higher infertility prevalence among bakers due to heat exposure.[31] Similarly, studies by Weyandt et al. and Lindaman et al. found that stress and environmental factors among military personnel negatively affected sperm quality.[32,33] A varicocele history was significantly associated with lower semen volume (37%) and lower sperm count (93%), aligning with Agarwal et al., who found varicocele led to reduced sperm count, motility, and morphology.[34] Cakiroglu et al. also linked long-standing varicocele to declining semen volume and sperm count.[35] A history of mumps significantly correlated with abnormal sperm shape (71.4%), a well-documented effect of mumps orchitis, as shown in Wu et al.'s study.[36] Finally, this study found a significant association between increased marital duration and abnormal sperm morphology (42.1% in >10 years of marriage vs. 25.8% in <10 years), likely influenced by age as an independent factor affecting sperm quality.

CONCLUSION

Predictors of poor seminal fluid quality among males with secondary infertility were the following: advanced age, higher BMI, alcohol consumption, having an occupation as a military personnel or baker, past history of diabetes mellitus, varicocele, mumps, previous surgery, and longer duration of infertility.

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