Research Paper

Effect of Environmental and Behavioural Risk Factors on Sperm Parameters in Infertile Men of Eastern Algeria.

Science

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ABSTRACT

Objectives: The purpose of this study is to characterize environmental and behavioural risk factors that may be associated with altered sperm parameters.
Materials and methods: This is a retrospective study carried out in the centre of assisted reproduction clinic Ibn Rushd , Constantine. We selected 404 patients with pathological semen parameters and / or spermocytogramme. Epidemiological, clinical and laboratory parameters were recorded for each patient and, after exclusion of azoospermia cases, sperm parameters were studied for 327 patients.
Results: The semen was disrupted in 84.3% of cases with a predominance of oligo-astheno-teratospermia. We found a small effect of age, smoking and taking hot baths on sperm parameters. In contrast we observed a significant decrease in the sperm count of subjects exposed to high heat and / or toxic inhalations.
Conclusion: This study shows a moderate effect of environmental and behavioural risk factors on sperm parameters. Exposure to heat and toxic substances seems to be the most deleterious factor for spermatogenesis.

Introduction

Infertility is nowadays a real public health problem. It is defined by the absence of conception after 24 months of unprotected sexual intercourse(Brzakowski and al., 2009). It affects 80 million people worldwide and about one in six couples faces a primary or secondary infertility (Le Goff and al., 2008). Infertility affects 15% of couples in France (Sharlip and al., 2002), and in Algeria, the president of the national association of centres of assisted reproductive technology (ART) has estimated that 300 000 couples were infertile that is to say 7% of couples of reproductive age. This discrepancy can potentially be explained by the youth of the Algerian population and the average age of mothers being lower at the time of conception of the first child. Male etiology is found in about two thirds of couples, whereas before infertility was mainly attributed to women (Sharlip and al., 2002).

The decrease in sperm parameters, observed for several decades, raised the problem of declining fertility in men. Numerous studies have documented that certain risk factors could affect spermatogenesis. In addition to physiological, genetic and environmental variations, lifestyle (tobacco, alcohol, hot baths) as well as psychosocial factors seem to affect sperm production in men (Sharpe and Franks 2002). However, several studies published in the medical literature and revolving around these factors and infertility present conflicting results. Further studies are therefore needed in order to better understand the effect of these factors on sperm pathophysiology. The objective of this study is to characterize different environmental and behavioural risk factors that can be associated

with altered sperm parameters in a population of eastern Algeria. Materials and methods

Target population

This is a retrospective descriptive study of 599 consecutive cases received between January 2011 and February 2012 in the centre of medically assisted reproduction (PMA) at the Ibn Rochd private clinic, Constantine. In all cases the patients were referred to the clinic by their doctor for infertility diagnosis. Four hundred and four patients were included in this study according to the following criteria: 1) man: married for over a year, 2) semen and / or pathological spermocytogramme, 3) the use of in vitro fertilization (IVF) by Intra Cytoplasmic Sperm Injection (ICSI) has been recommended. Men with normal semen analysis and spermocytogramme and intended for a PMA with a female indication were excluded. Spermatic parameters were studied for 327 patients after exclusion of azoospermia.

Through a questionnaire, each patient was interviewed on the following parameters : - Epidemiological : Age, occupation, place of habitat, lifestyle factors (physical activity, cigarette smoking and alcohol, hot baths, heat exposure, toxic agents and radiation). - Clinical: Type and duration of infertility, weight, urogenital history, medical, family, the couple inbreeding, parental consanguinity, data from the clinical examination. - Paraclinical: semen analyzes were performed according to the WHO criteria after a period of 3 to 4 days of abstinence, sperm collection is carried out in the laboratory, by masturbation. For normal sperm, the sperm count was ac-

cepted as greater than 20 million / ml; oligozoospermia 5-20 million / ml and severe oligozoospermia less than 5 million / ml. The mobility was assessed by calculating the proportion of normal mobility forms and reduced mobility (degree of a and b of the WHO classification) of the total number of mobile forms. The mobility has been described as normal if 50 % or more of sperms are progressively mobile less than 30 minutes after ejaculation, asthenozoospermia with less than 50 % of normal mobility and decreased (a + b). The spermocytogram was performed according to the modified classification of David (Auger and al., 2000) to 327 patients. A normal sperm contains more than 30 % of normal sperm, teratozoospermia was noticed in over 70 % of abnormal sperm. A testicular biopsy was performed in some cases of azoospermia. An assessment of infection (Mycoplasma, Chlamydia, VDRL , TPHA , HIV1 , HIV2 , HCV, HBs Ag) was conducted systematically. Each patient underwent an ICSI involving the direct injection of a single spermatozoa into the cytoplasmic oocyte using a micromanipulator.

Statistical analysis:
Data collection was done on the basis of a questionnaire containing all the parameters to be studied before being introduced into an Access database. The results were analyzed by two statistical calculation software programs: 'EPIINFO v 3.5' and 'Med calcul'. These last two have allowed us to carry out for a descriptive analysis of each variable through the calculation of averages and frequencies and in order to check the independence of two or more qualitative characteristics, we used the PEARSON X2 statistical test. The search for a correlation between the parameters sperm and age was made by calculating the linear regression correlation coefficient, the ANOVA test was used to compare mean values between sperm parameters of the different groups studied (Table 1, 2 and 3).

Results
Frequency :
Of the 599 files included at the centre of the PMA for infertility, the frequency of patients with semen and / or pathological spermocytogramme was 83.3 %. We can therefore consider that among couples consulting for infertility, a feminine indication alone was present in 16.7 % of couples. Among the 404 patients included in our series, 70.5 % have shown a masculine indication alone and 29.5 % have shown a mixed masculine and feminine indication.

Clinically
Infertility was primary in 90.3 % (n = 365) and secondary in 9.7 % (n = 39) with an average duration of 6,7 ± 3,6 years with extremes of one year and 20 years, with 42.8% of patients presenting infertility of 1-5 years , and 45% of 6-10 years.

Evolution of spermatic parameters according to age
The average age of patients was 38±5.6 years , with extremes of 26 and 55 years, the age bracket between 36 and 40 has provided the most cases with 153 patients (37.9 %) followed by the 31 to 35 years with 98 cases (24.30 %) (Figure.1). The average age of partners was 32.6±4.96 years with extremes of 18 and 46 years. We observe that patients aged 26 to 40 years are most commonly affected by primary infertility (p < 0.001) and older patients (41-55 years) suffer more frequently of secondary infertility than younger patients (26 – 40 years) (p < 0.001).

The distribution of age
frequencies shows that nearly 85% of our population of men are aged 25-45 years. The average ejaculat volume, calculated on the entire sample (327 cases), is 2.9±1.6 ml, the average sperm count was 37.6±35.6 (x106/ml), the average mobil-

ity of forms (a + b) is 28.8+17.4 %, the percentage of atypical forms is 67.9±22.6 %. The study of the linear regression of semen parameters according to age allows us to observe a significant correlation between age and sperm motility (P = 0.01) with a correlation coefficient r = 0.135, r2 = 0.015, indicating an increase in mobility with age. However analysis of our data by age bracket indicates a significant decrease in mobility and in the percentage of typical forms after 45 years (data not shown). The study by linear regression for all age groups indicates results that are apparently contradictory because of being based on the analysis of a large majority of patients in the 31-45 age bracket (Figure.1). The percentages of variance explained by the regression line (r2) and the correlation coefficients (r) demonstrated that there is no significant link (ns) between the spermatic volume, the sperm count and the frequency of atypical forms according to age (Figure.

2. Biologically
Regarding the spermatic results, the semen analysis was disrupted in 83.3 % of cases. Of these patients, oligo-asthenoteratospermia (OAT) was objectivised in 104 cases (25.7 %) and shows the sperm abnormality the most represented. We then observed an asthenospermia (A) in 83 patients (20.5 %), an astheno-teratospermia (AT) for 79 cases (19.5 %), azoospermia(AZ) was noted in 46 cases (11.4 %), an oligozoospermia (O) 41 cases (10.1 %) with a severe oligozoospermia (OS) 27 cases and a moderate oligozoospermia (OM) for 14 cases than an oligo-asthenospermia (OA) for 35 cases (8.4%) (Figure. 3). Finally, 16 cases (4 %) had abnormal volume (HPOR group) with 13 cases of hypospermia (HPO) and 3 cases of hyperspermia (HPR) , while for 100 patients (16.4%) the semen analysis was normal.

The occupation
Recruited patients were divided into seven socio-professional groups. The most represented group was the group 7 of officials with 27.7% (n = 108), followed by group 4 of military (63 cases) and security agents (17cas) with 21.03%, followed by the group of traders (70 cases) with 17.3%. The study of the dependence between the profession and sperm parameters showed a significant decrease in the sperm count p <0.01 of cooks, drivers and workers in comparison with the liberal profession group and a significant decrease in the count p <0.05 in the group of cooks, drivers, labourers and farmers sets in comparison with other groups (Table. 1).

Physical activity
217 subjects that is to say (53.7 %) do not practise any sport against 108 (26.7 %) of patients who practise sport regularly (≥ 2 times per week), 8.2 % practised it rarely and 11.4 % have stopped completely.

Hot baths
36.9 % of the studied patients regularly take hot baths against 63.1 % who rarely or never do. We found a significant difference in spermatic parameters p < 0.05 in both groups with an increase in the volume of patients who regularly take hot baths compared to those who don't take any (Table. 2).

Alcohol and tobacco
Regarding risk behaviors, among the cases studied, 210cas (52%) do not smoke against 175 cases (43.31%) who smoke. Of a total of 130 smokers, 90 patients or 69.2 % consume more than 20 cigarettes per day (c / d) against 40 patients (30.8 %) who consume less than 20 cigarettes per day. the link between cigarette smoking and sperm parameters did not show a significant difference in motility, morphology, and volume of the two groups but the difference in the count didn't show a decrease in the group who smoke (Table. 3). Among the 404 patients, 87.6 % of subjects never consumed alcohol

against 8.5 % who have consumed it. There is no significant difference between alcohol consumption and the various sperm parameters. Thirty-five alcoholic patients who smoke (AS) and 217 cases of non-alcoholic non-smokers (NA / NS). Primary infertility was objectivised in 91.4 % of cases of AS (32/ 35) and 91.7 % in NS / NA (199/217). The study of the influence of smoking and alcohol consumption together didn't show a significant difference in mobility, morphology and volume of sperm but the significant difference in count between the two groups of NS/NA and S/NA show a decrease in count in the group of NS/NA Justified, Indend: Left: 0.1", Right: -0.02", Space Before: 1.6 pt, Line Spacing: Multiple 1.04 li

Urogenital history
Among the 404 patients, we identified in this study, 320 patients (79.2%) do not have urogenital history. Against by the rest of the population, 84 cases (20.8%) have urogenital history, we noted a predominance of varicocele with 64 cases (15.8%), followed by a history of testicular problems with 14 cases (3.5%) and the inguinal hernia with 6 cases (1.5%). Varicocele is associated with OAT in 19 cases or 29.7% of AT in 17 cases or 26.6% A and 10 cases or 15.6%.

Family history of infertility
Among the 404 cases, 281 cases or 69.6% having no family history, 123 cases (30.4%) were shown to have a family history of infertility. Among the 123 cases, we noted a high percentage of sibling history of infertility with 62 cases (15.3%) followed by family history with 43 cases (10.6%) and 18 cases with a history of siblings and family (4.5%).

Parental consanguinity
The concept of parental consanguinity is indicated in 59 cases (14.1 %) and not specified in 179 cases (44.3 %). The concept of parental consanguinity appeared in 33.9% of patients with a history of siblings, 33.3% of patients with a history of family and siblings together and 7% of patients with a history of family.

Discussion
At the completion of our work, we noted a frequency of semen analyzes and pathological spermocytogrammes 83.3%, our results are consistent with those in the literature with 81.5 % (Toure and al.,1995) and 91.9 % (Koikana Chacka 1998). Among the 404 patients included, 70.5 % represent masculine indications and 29.5 % represent male and female mixed indications. Furthermore, most studies agree that in recent decades there has been a remarkable decline in fertility rates in northern countries(Kaufmann and al., 1998),(Pearce and al., 1999) .Several studies have shown that masculine infertility, whether isolated or not, is present in over 50% of infertility in couples. We identified an African study which was conducted on 340 infertile couples in Nigeria, and which has found a male cause in 42.4 % (Ikechebelu and al., 2003). In our study we observed that the male anomaly rate was about twice as high. This discrepancy may be due to a difference in the recruitment or criteria used in the sperm analysis.

Ninety percent of our patients had primary infertility, the average duration of infertility was marked by a high extreme variability of 1 year to 20 years. The duration of 6-10 years is most frequent with 45.3 %, indicating that a majority of patients consult late. Our results match those in the literature that indicate an average of 6 years and extremes going from 1 to 30 years (Niang and al., 2009).

MacLeod in 1953 (Mac Leod and al., 1953) had found an increase in the conception period according to male age, regardless of the age of the woman. The study of the relationship between age and male fertility poses difficult methodological

problems. We cannot, in fact, evaluate the role of age on the male component of couples's fertility regardless of other factors of this fertility such as the age of the spouse, the evolution of the frequency of sexual intercourse. The study of the evolution of sperm characteristics with aging is one of the methods for analyzing indirectly the relationship between age and male fertility. In our series we noted an average age of 38±5.65 years, with extremes of 26 and 55 years and the age group of 36-40 years is the most represented with 37.90 % of patients (Figure. 1). Overall primary infertility rate is significantly higher among the age group 26-40 years (p <0.001) compared to the age bracket of 41-55 years.

Logically secondary infertility was significantly higher among 41-55 years (p <0.05) probably because some patients with sub-fertility have had more time to try in some cases taking new wives, sometimes more fertile, because polygamy is permitted in Algeria . Our results confirm those of the literature (Niang and al., 2009), (Bah and al., 2007). The advanced age of our patients may also be explained by the delay in the consultation because of the myth that the female bears the sole responsibility in the couple's infertility.

The study of the evolution of sperm characteristics in the 327 patients according to age allows us to analyze the impact of age on sperm parameters. The percentages of variance explained by the regression line (r2) and the correlation coefficients (r) demonstrated that there is no significant link (ns) between the spermatic volume, the sperm count and the frequency of atypical forms according to age. However, and surprisingly, an increase in mobility was observed with age (p < 0.05) (Figure. 2). An analysis by age bracket indicates that the mobility and the percentage of normal sperm decrease after 45 years. It was noted that these parameters can be correlated because in many cases the morphological abnormalities lead to impaired mobility. It was also observed that there is a slight decrease in sperm volume with age (Figure. 2).

Our results confirm those of the literature. Several studies have analyzed the influence of age on characteristics of semen in fertile men. Some studies (Boulegue and al., 1999) have reported that sperm parameters appear on average to be independent of the age between 20 and 60 years, which suggests that the quality of the ejaculate is retained until 50 to 60 years. (Schwartz and al., 1983)"container-title":"Fertility and sterility","page":"530-535","volume":"39","issue":"4","source":"NCBI PubMed","abstract":"The relationship between age and semen characteristics has been studied; any effect due to the influence of the length of abstinence preceding ejaculation was eliminated. There is an improvement in semen characteristics up to 25 years of age, followed by a leveling off and a subsequent decrease. This variation is not significant as far as the sperm count, semen volume, and the total number of spermatozoa are concerned. The variation, although small, is highly significant for the morphologic characteristics and prefreeze and postthaw motility. The values for the older subjects were significantly lower for postthaw motility in the group 36 to 40 years of age, in the group 41 to 45 years of age for morphologic normality, and in the group 46 to 50 years of age for prefreeze motility. The lower values in the group 21 to 25 years of age are particularly noticeable with regard to morphologic characteristics. The same curve is encountered in the variation with age of each abnormal form, but the most marked variation is found in the increased percentage of coiled tails, which first appears in the group 36 to 40 years of age.","ISSN":"0015-0282","note":"PMID: 6832409","journalAbbreviation":"Fertil. Steril.","language":"eng","author":[{"family":"Schwartz","given":"D"},{"family":"Mayaux","given":"M_J"},{"family":"Spira","given":"A"},{"family":"Moscato","given":"M_L"},{"family":"Jouannet","given":"P"},{"family":"Czyglik","given":"F"},{"famil

y":"David","given":"G"}],"issued":{"date-parts":[["1983",4]]},"PM
ID":"6832409"}}],"schema":"https://github.com/citation-style-
language/schema/raw/master/csl-citation.json"} compared
the average values of five parameters: volume, sperm concentration, percentage of morphologically normal forms, percentage of mobile forms and total count in 833 fertile men aged 21-50 years. They did not reveal any significant changes in these parameters with age. On the other hand, they observed significant variations in the percentage of normal forms and the percentage of mobile forms with age: the latter reach a maximum between 25 and 35 years and then decrease in older men. These authors showed that the morphological abnormalities significantly observed are microcephalia forms before 25 years and coiled flagella after 45 years. It should be emphasised that through the recruitment of our population, there was a bias linked to the spread of the observed values of age, for a particular age, of all semen parameters, the small number of patients in some age brackets, may explain the absence of correlation between age and sperm parameters studied. Infections, environment, genetics, diseases and injuries are among the main causes of male infertility. Many professional situations are known to be a risk to the fertility of men who are exposed to them (Guerin, 2001), (Cohen, 1977). We noted a significant reduction p <0.05 in counts and mobility in the groups exposed to toxic hazards and / or to high temperatures: drivers, cooks, farmers and workers in relation to other lower-risk groups (Table. 1). For the profession of driver, particularly exposed to environmental toxins, (Thonneau and al., 1991) showed a longer average conception period among those who had a time of driving of more than 3 hour / day. Some studies have demonstrated that in humans and animals, the heat disturbed the spermatogenesis and could reduce the male fertility (Maurice 1995). Men exposed to high temperatures is constitute therefore a population at risk and it was observed that the workers attending to ceramic kilns exhibited a drop in the mobility of gametes perhaps explaining a significant increase in couples without children in this population (Maurice 1995). This effect of the heat is not found in patients described as taking regular hot baths. Presumably, in this case, the frequency and duration exposure is not sufficient to alter gametogenesis.

In humans, certain pesticides such as dibromochloropropane or ethylene dibromide used by farmer cause alterations of spermatogenesis (Maurice1995). It should be noted here that a decrease in sperm parameters was observed among farmers potentially exposed to many toxic substances. The association between cigarette smoking and infertility and altered sperm parameters has already been described. In the present study regarding risk behaviors, among the cases studied, 210 cases (52%) do not smoke against 175 cases (43.31%) who smoke. A total of 130 smokers, 90 patients (69.2 %) consume more than 20 c / d against 40 patients (30.8 %) who consume less than 20 c / d. Recent studies have shown there is a passage through the blood-testis barrier of certain substances in the cigarette smoke. The presence of such compounds in the seminal fluid of smokers causes alteration of conventional semen parameters and sperm nuclear grade, thereby compromising the chances of pregnancy. The oxidizing stress generated by the tobacco seems to be one of the main causes of impaired sperm quality, resulting mainly in the fragmentation of their DNA (Trummer and al., 2002), and a change in the concentrations of testosterone and hormone prolactin (Kumosani and al., 2008). Numerous studies have implicated tobacco in erection disorders and alterations in sperm quality in particular, in 2008 the study of (Curtis and al., 1997) showed a significant decrease in the mobility as well as abnormalities in counting, whilst no significant differences were found as regards the volume and the quality of the sperm. In our study the link between cigarette smoking and sperm parameters did not show a significant difference in motility, mor-

phology, and volume of the two groups but the difference in the count didn't show a decrease in the group who smoke (Table. 3). In our study we did not performed any test for measuring DNA fragmentation and cannot unfortunately confirm the effect of tobacco on this factor. We are currently collecting the ICSI results in order to assess whether the pregnancy rate is reduced in smokers, which may be due to a greater fragmentation of sperm DNA.

The data on the effect of alcohol consumption on spermatogenesis is rare; it shows an apparent protective effect of moderate drinking on sperm parameters probably due to the antioxidant effect of certain alcoholic beverages. Some studies have shown that alcohol consumption by men was not associated with fertility (Dunphy and al., 1991).

However, heavy drinking (> 20 units / week) is known to be associated with subfertility (Hassan and Killick 2004)United Kingdom.\nPATIENT(S. Our results are consistent with the literature and the correlation test between the different alcohol and sperm parameters did not show a significant difference. Note that only a minority of our patients admitted to drinking alcohol. Our predominantly Muslim population is probably not the most appropriate one to observe for a potential effect of alcohol, as this remains a taboo and all our patients did not report perhaps their alcohol consumption. The study of the influence of smoking and alcohol consumption together don't show a significant decrease in sperm parameters.

OAT and A are the two most representative abnormalities with 25.7 % respectively and 20.5 %, followed by AT and Azoospermia with 19.5 % and 11.4 % (Figure. 2) respectively. The presence of varicocele is also a common abnormality, the exact association between reduced male fertility and varicocele is not known but some WHO publications (Hamamah, Barthelemy 1997) clearly indicate that varicoceles are associated with sperm abnormalities, reduced testicular volume and deterioration of the function of Leyding cells. Numerous studies have shown a deleterious effect of varicocele on spermatogenesis in particular with a decrease in sperm density (oligospermia) or even azoospermia and reduced mobile forms (A), a teratozoospermia, or OAT. In our study we found a predominance of varicocele with 64 cases (15.8%) compared to other urogenital history. Varicocele is associated with OAT in 19 cases (18.3 %), AT in 17 cases (21.5 %) and A in 10 cases (12%). These results are consistent with a literature review which identified a small number of articles in which the data show the existence of an OAT in 25 to 65% of men carrying a clinical varicocele (Mieusset and al., 1996). A number of genetic abnormalities are responsible for infertility usually irreversible. This is particularly the case of Klinefelter syndrome. Other human infertilities of genetic origin accompanied by oligospermia or even azoospermia as is the case of agenesis of the deferent canals, which may however, be supported by ICSI. In some cases, ICSI should be accompanied by a genetic balance (constitutional karyotype, investigation of microdeletions of the Y chromosome). The presence of family history can guide us to a genetic cause. Among the 123 cases we noted a high percentage of sibling history of infertility with 62 cases (15.3 %), followed by family history with 43 cases (10.6 %) as well as 18 cases having a siblings and family history (4.5 %). Therefore the research at the time of the interrogation of family members suggestive of a genetic disorder should be part of the exploration of male infertility, although genetic counselling requires expertise in order to deliver adequate information about risks in siblings and family, offspring, the chances of success in cases of artificial procreation techniques.

Conclusion
This study shows a moderate effect of the environmental

and behavioural risk factors on sperm parameters. Exposure to heat and toxins appear to be the most detrimental factor for spermatogenesis. We did not observe any adverse effects of alcohol and tobacco. In contrast we observe a significant decrease in the count of subjects exposed to high heat and / or toxic inhalations. This study confirms that certain environmental and behavioural factors can change sperm parameters and consequently lead to a drop in fertility. The couple's questioning, clinical examination and semen analysis are the essential elements of the balance sheet of male infertility. They direct additional tests that will identify one or more causes of infertility and thus tailor treatment specifically.

Tables

Table. 1: Comparison of mean values of sperm parameters of 7 professional groups

Professional groups	Effective	Count (10^6/ml)	Mobility (%)	Morphology (%)	Volume (ml)
Group1	33	27.5±29.8*	24.4±18.6	71.6±25.1	3.1±1.8
Group2	07	34.3±32.2	23.9±13	64.9±23.5	3.3±2.3
Group3	18	28.3±24.1**	28.8±18.3	61.9±26.9	2.8±1.5
Total Groups 1-3	58	28.5±28***	25.7±17.8	66.1±26.6	3±1.8
Group4	63	34.8±40	30±19.4	68.5±22.2	3.2±1.8
Group5	48	52.5±38.6*,**	31.4±18.6	65±22.9	2.9±1.9
Group6	60	41.6±38.6	27.7±16.4	66.2±22.2	2.8±1.6
Group7	88	39.9±41.9	29.6±16.1	71.2±20.6	2.8±1.4
Total Groups 4-7	259	41.4±40.5 ***	29.6±17.4	68.2±21.8	2.9±1.6
Big Total	317	38±35.7	28±17.2	67±23.3	3±1.8

Results are presented as mean ± SD.
Significant differences between groups were noted: * p <0.01, **, *** p <0.05.

Group 1: cooks and drivers / Group 2: farmers / Group 3: workers / Group 4: security guards, military / Group 5: liberal / Groups 6: traders / Groups 7: officials.

Table. 2: Influence of hot baths on different sperm parameters

Groups	Effective	Count (106/ml)	Mobility(%)	Morphology (%)	Volume (ml)
Little hot baths	217	38.1±37.3	28.8±17	68.1±22.1	2.8±1.4*
Followers of hot baths	110	39.4±40.9	28.8±18.2	67.6±23.6	3.2±2*
Total	327	38.6±38.5	28.8±17.4	67.9±22.6	2.9±1.6

Results are presented as mean ± SD.
Significant differences between groups were observed: * p <0.05

Table. 3: Influence of tobacco on different sperm parameters

Groups	Effective	Count (106/ml)	Mobility(%)	Morphology (%)	Volume (ml)
Group1	38	37.5±36.6	29.8±17.9	70.4±19.4	2.9±1.9
Group2	76	44.4±38.9*	28.6±16.9	67.9±21.7	2.7±1.6
Group 1+2	115	42.1±38.1**	29±17.1	68.7±20.9	2.8±1.7
Group3	167	32.7±31.9*,**	30±17.9	67±23.3	2.8±1.7
Total	182	36.5±34.8	29.6±17.6	67.7±22.4	2.9±1.6

Results are presented as mean ± SD, significant differences between groups were observed: *, ** p <0.05.

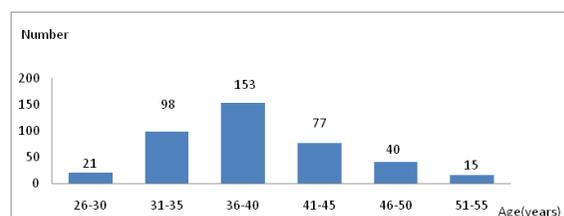Group 1: Smoking <20c / d / group2: Smoking> 20c / d / Group 1+2 : smoker /Group 3: non-smokers

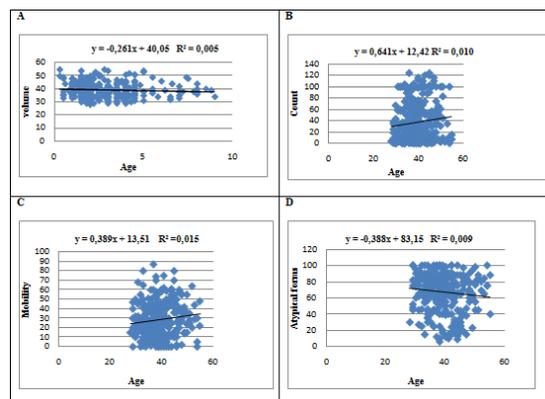**Figure. 1: Frequency distribution of age of the study population**

Figure. 2: Evolution of sperm parameters according to age A: Sperm volume, B: count, C: Mobility, D: Morphology sperm (% atypical forms).
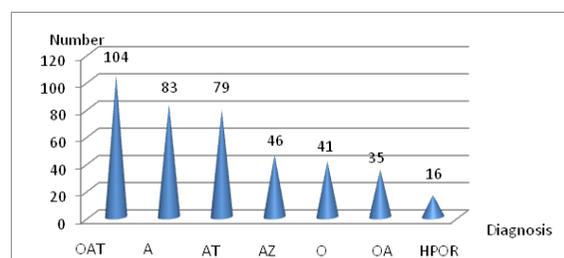

Figure. 3: Distribution of the frequency of sperm abnormalities.

A: asthénospermia / OAT: oligo-astheno-teratospermia / AT: astheno-teratospermia / O: oligospermia / OA: oligo-asthenospermia / Az: azoospermia / HPOR: hypospermia + hyperspermia.

REFERENCE

Auger, J., F. Eustache, et G. David. 2000. Standardisation de la classification morphologique des spermatozoïdes humains selon la méthode de David modifiée. Andrologie 10 (4): 358-373. | Bah, Oumar Raphiou, Abdoulaye Bobo Diallo, Alimou Diallo, Sékou Guirassy, Ibrahima Bah, Macka Barry, et Mamadou Bobo Diallo. 2007. Infertilité masculine: Fréquence et aspects étiologiques au service d'Urologie-Andrologie du CHU de Conakry. Andrologie 17 (3): 241-245. | Boulegue, D., L. Janny, J. L. Pouly, D. Boucher, et J. Hermabessiere. 1999. Fertilité de l'homme en fonction de l'âge. Andrologie 9 (1): 28-41. | Brzakowski, M., E. Lourdel, R. Cabry, M.-F. Oliéric, C. Claeys, A. Devaux, H. Copin, et P. Merviel. 2009. Épidémiologie du couple infertile. Journal de Gynécologie Obstétrique et Biologie de la Reproduction 38 (janvier): F3-F7. | Cohen J. 1977. Les stérilités et hypofertilités masculines. Paris, Masson. Vol. 13-15, 27-35, 45-46, 49, 51-60, 63, 66, 69-80, 123-124. | Dunphy, B C, C L Barratt, et I D Cooke. 1991. Male Alcohol Consumption and Fecundity in Couples Attending an Infertility Clinic. Andrologia 23 (3): 219-221. | Guerin J.F. 2001. Bilan raisonnable devant une infertilité masculine. Journées pyrénénnes de gynécologie, Tarbes. Paris. | Hassan, Mohamed A M, et Stephen R Killick. 2004. Negative Lifestyle Is Associated with a Significant Reduction in Fecundity. Fertility and Sterility 81 (2): 384-392. | Ikechebelu JI, Adinma JI, Orie EF, Ikegwuonu SO. 2003. High prevalence of male infertility in southeastern Nigeria. J Obstet Gynaecol 23: 657-59. | Kaufmann RB, Spitz AM, Strauss LT, et al. 1998. The decline in US teen pregnancy rate. Pediatrics 102: 1141-47. | Koikana Chacka. 1998. Infécondité conjugale dans le service de gynéco-obstétrique du centre de santé de référence de la commune V (A propos de 518 cas). Thèse Med, Bamako. | Kumosani, T A, M F Elshal, A A Al-Jonaid, et H S Abduljabar. 2008. The Influence of Smoking on Semen Quality, Seminal Microelements and Ca2+-ATPase Activity among Infertile and Fertile Men. Clinical Biochemistry 41 (14-15): 1199-1203. | Le Goff, S., N. Lédée, et G. Bader. 2008. Obésité et reproduction : revue de la littérature. Gynécologie Obstétrique & Fertilité 36 (5): 543-550. | Mac Leod J. Gold RZ. 1953. The male factor in fertility and infertility. VII: Semen quality in relation to age and sexual activity. fertility and sterility 4: 197-207. | Maurice Auroux Emmanuel Dulioust. 1995. Environnement, spermatozoïdes et descendance. Medecine/science 11: 571-7. | Mieusset, R., L. Bujan, M. Daudin, G. Massat, A. Mansat, et F. Pontonnier. 1996. Approche clinique d'une OAT. Andrologie 6 (2): 154-163.. | Niang, L., M. Ndoye, I. Labou, M. Jalloh, R. Kane, J. J. Diaw, A. Ndiaye, et S. M. Guèye. 2009. Profil épidémiologique et clinique de l'infertilité masculine à l'hôpital général de Grand-Yoff, Sénégal: à propos de 492 cas. Andrologie 19 (2): 103-107. Pearce D, Cantisani G, Laihonen A. 1999. Changes in fertility and family sizes in Europe. Popul Trends 95: 33-40. | Hamamah S, Barthelemy C. 1997. Spermogramme et tests de fécondance : intérêt et limites. | Schwartz, D, M J Mayaux, A Spira, M L Moscato, P Jouannet, F Czyglik, et G David. 1983. Semen Characteristics as a Function of Age in 833 Fertile Men. Fertility and Sterility 39 (4): 530-535. | Sharlip, Ira D, Jonathan P Jarow, Arnold M Belker, Larry I Lipshultz, Mark Sigman, Anthony J Thomas, Peter N Schlegel, et al. 2002. Best Practice Policies for Male Infertility. Fertility and Sterility 77 (5): 873-882. | Sharpe, Richard M, et Stephen Franks. 2002. Environment, Lifestyle and Infertility--an Inter-Generational Issue. Nature Cell Biology 4 Suppl (octobre): s33-40. | Thonneau P, Marchand S, Tallec A, Ferial ML, Ducot B, Lansac J, et al. 1991. Incidence and main cause of infertility in a resident population (1850000) of three French regions (1988-1989). In , 811-6:6. | Toure A, Traore M, Zubowa I. 1995. Aspects cytospermiologiques de la stérilité masculine. Revue Malienne de Sciences et Technologie, 2:5. | Trummer, Harald, Helga Habermann, Josef Haas, et Karl Pummer. 2002. The Impact of Cigarette Smoking on Human Semen Parameters and Hormones. Human Reproduction (Oxford, England) 17 (6): 1554-1559. | |