Semen quality in 24693 Turkish men over a 16 year period (1995-2011)

24693 Türk Erkeğinde 16 Yıl Süresince (1995-2011) Semen Kalitesindeki Değişim

Research Article

İsmet Çok[1]*, Gamze Karababa[2], M.Hakan Şatıroğlu[2], Ayça Çakmak Pehlivanlı[3], Gülşen Göney[1], Uğur Çiftçi[4]

[1] Gazi University, Faculty of Pharmacy, Department of Toxicology, 06330, Ankara, Turkey
[2] HS Clinic, 06700, Cankaya, Ankara, Turkey
[3] Mimar Sinan Fine Arts University, Statistics Department, 34380, Istanbul, Turkey
[4] Duzen Laboratory Group, 06680, Kavaklıdere, Ankara, Turkey

ABSTRACT

Studies reporting the sperm count as well as the sperm morphology and quality of Turkish men are limited with case reports and they do not build up a general consensus on this matter. Because of this reason, we evaluated any possible changes in semen quality parameters of Turkish normospermic men during the past 16 years. This is a retrospective study of 24693 men with semen data between 1995 and 2011. Semen quality was evaluated by individual and age dependent (age groups: 18-25, 26-30, 31-35, 36-40, 41-50) statistical analysis of semen volume, sperm concentration, total sperm count and motility. Considering all age groups, mean sperm concentration was found to be $73.2x10^6$/mL. We also demonstrated that mean semen volume of Turkish men is 3.93 ±1.93 mL. C (+2) motility parameter significantly decreased in all age groups. Considering the high number of cases included and the duration studied, the present study is first in reporting Turkish men semen quality.

Key Words
Semen quality, Sperm count, Sperm motility, Turkey.

ÖZET

Türk erkeklerinde sperm sayısı, sperm morfolojisi ve kalitesi hakındaki çalışmalar vaka raporları ile sınırlı olup semen kalitesi hakkında genel bir bilgi verememektedir. Bu nedenle çalışmamızda normospermik Türk erkeklerinde 16 yıl süresince semen kalitesindeki değişiklikler değerlendirmeye alınmıştır. Sunulan araştırma retrospektif bir çalışma olup 1995 ve 2011 yılları arasında 24693 erkeğe ait semen verileri değerlendirmeye alınmıştır. Semen kalitesi yaşa ve bireylere bağlı olarak semen hacmi, sperm konsantrasyonu, toplam sperm miktarı ve sperm hareketliliği istatistiksel olarak analiz edilerek değerlendirilmiştir (yaş grupları: 18-25, 26-30, 31-35, 36-40, 41-50). Değerlendirme sonucunda tüm yaş gruplarında sperm konsantrasyonu $73.2x10^6$/mL olarak bulunmuştur. Ayrıca Türk erkeklerinde semen hacmi 3.93±1.93 mL olarak belirtilmiştir. C (+2) hareketlilik değeri tüm yaş gruplarında dikkat çekici bir şekilde düşüş göstermiştir. Sunulan çalışma gerek kişi sayısı gerekse değerlendirilen yıllar göz önünde bulundurulduğunda Türk erkeklerinde semen kalitesinin değerlendirildiği ilk çalışma olma özelliğine sahiptir.

Anahtar Kelimeler
Semen Kalitesi, Sperm Sayısı, Sperm Hareketliliği, Türkiye.

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Correspondence to: Gazi University, Faculty of Pharmacy, Department of Toxicology, 06330, Hipodrom-Etiler, Ankara, Turkey.
Tel: + 90 321 2023089 Fax: +90 312 222 2326 E-Mail: ismetcok@gmail.com

INTRODUCTION

In all societies male reproductive health and threatening factors has become an important public health issue. There are growing evidence that genetic and epigenetic factors (Klinefelter syndrome, single nucleotide polymorphisms), life style factors (obesity, smoking) and environmental factors (endocrine disrupter chemicals) have critical roles for male reproductive health. Decrease in sperm quality is one of the most significant current threats to men' reproductive health [1] and effected by one or more of these factors. In many European countries and Japan, large proportions (20-40%) of young men have semen quality below WHO reference level, which reduces their ability to father children. In 1992, a meta-analysis published by Carlsen et al. [2] showed that, in the developed countries, the mean sperm concentration of the men, which was 113 million/mL in 1940, had by 1990 decreased to 66 million/mL. These striking results, which are extremely important for the continuation of the human race, are a subject of great concern among many people and organizations around the world, and have been the driving force behind intensive research related to the issue. Some studies support the results of this meta-analysis [3-6], whereas others report that there is no cause for alarm, either for men or for future generations in some regions [7-9].

In Turkey, studies reporting the sperm quality and morphology are limited to case studies, and so are insufficient for the formation of a general opinion on the subject [10-13]. Furthermore, there is lack of information about what kinds of changes have occurred over the years, positively or negatively. Considering all these facts, the aims of this study, which is based on information on hospital admissions, are determined as follows: (i) to determine the current average sperm count in men in Turkey, (ii) to prepare a basis for further investigations into the reasons behind the differences between the detected values and values from previous studies by making comparisons (iii) to contribute to the evaluation of infertility cases in Turkey (iiii) to provide information on possible changes in sperm concentrations and quality in the future.

MATERIALS AND METHODS

Subject characteristics

The study was based on the retrospective review of a total 24693 subjects. The medical records of men admitted to the Düzen Laboratories Group, Ankara Centre for infertility evaluation between January 1995 and June 2011 were reviewed. Digital data was obtained, and the distribution of subjects by year and age is presented in Table 1. Some of the data from 2000 has been excluded from the study due to incomplete parameters. In the present study, the semen of 24693 men aged 18–50 was evaluated in five age groups: 18–25 years (n= 2085 persons), 26–30 years (n=5577 persons), 31–35 years (n=7324 persons), 36–40 years (n= 5624 persons) and 41–50 years (n=4083 persons). All the semen samples were collected by masturbation into sterile plastic containers at the laboratory after 3 to 5 days of sexual abstinence, mean 4.2 days. Semen samples were allowed to liquefy at 37°C for an initial period of 30–60 minutes, and all analyses were performed within 90 minutes of ejaculation. Semen analysis was performed by a specially trained laboratory technician according to the standardized methods recommended by the WHO [14]. The following parameters were included in the evaluation: a) the amount of semen (volume), b) the sperm concentration (10^6/mL), c) the total amount of sperm, and d) motility values i) A (+4) motility, ii) B (+3) motility, iii) C (+2) motility, iiii), D (+1) motility.

The values for sperm morphology were not evaluated as this parameter falls outside the scope of the study. Considering the possibility of disease or infertility among the volunteers, only men with a sperm concentration of $20x10^6$/mL or more, which is considered as normospermia according to the WHO (1992) criteria were included in the study. Similarly, men with polyspermia (sperm count > $250x10^6$/mL) were excluded from the study. All experimental procedures in the current study were approved by the Mersin University Clinical Research Ethical Committees in Mersin (2012/94).

Statistical methods

Since the data set was very large and variances were not homogenous which were tested by Levene, binary comparisons of years and years with age groups were performed by Tamhane's post hoc test. In order to determine the relationship between variables, Spearman's correlation coefficient was used. Linear regression was also applied to obtain R^2 value which is a proportion of variation in variable (semen volume, sperm count, etc.) explained by year. All statistical analyses were conducted using SPSS version 19.0 and MS Excel.

RESULTS

Main characteristics and semen parameters of subjects from 1995 to 2011 (June) are presented in Table 1. On the other hand, summary of outputs that obtained for semen quality in period of 1995-2011 is presented in Table 2. The means of age, sperm concentration, and percentages of motile sperm for the studied population (n: 24693) were 33.79±5.71 years, 73.2±48.2 x10^6/mL, and 38.4% respectively. The mean value (SD) for semen volume was 3.93 (1.93) mL and there was not found any significantly change over the 16 years (p>0.05). In the present study, subjects aged between 18-50 years were evaluated and divided into 5 separate age groups (18-25, 26-30, 31-35, 36-40, 41-50) to investigate the effects on semen by aging. The present study differs from the previous studies in that respect. While sperm count decreases by year between 1995-2011 in all age groups, except for 41-50 years age group, semen volume increases (not statistically significant) in 18-25 years and 26-30 years age groups. In line with this increase, total sperm volume increases in the age groups 18-25 years and 26-30 years while decreasing in the age groups 31-35 years and 36-40 years. There was no statistical increase or decrease in the age group of 41-50 years (p>0.05).

Evaluation of the change in the semen volume within years did not reveal a statistically significant difference (p=0.256; > 0.05) (Figure 1). Likewise, sperm concentration also did not significantly decrease within years

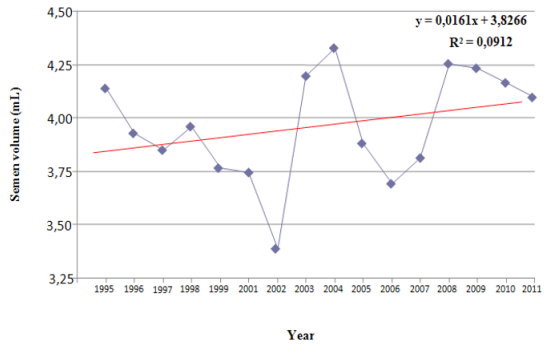

Figure 1. Variations over time and linear regression analysis of mean semen volume between the study period in men with sperm concentration higher than 20x10^6/mL.

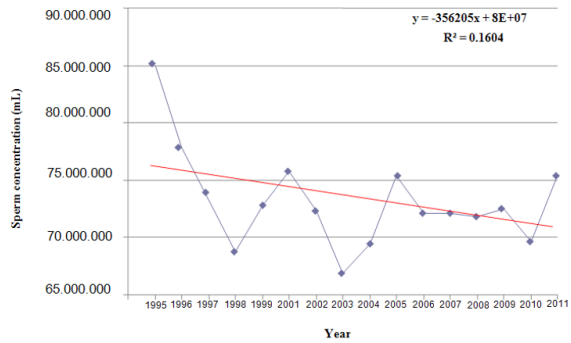

Figure 2. Variations over time and linear regression analysis of mean sperm concentration between the study period in men with sperm concentration higher than 20x10^6/mL.

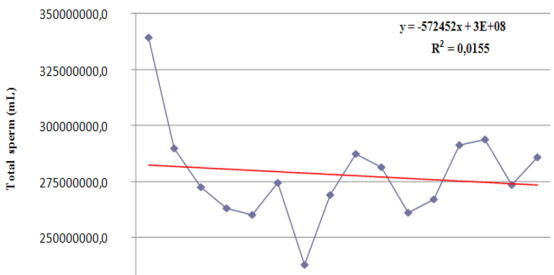

Figure 3. Total sperm count between 1995 and 2011.

(p=0.124; > 0.05) (Figure 2). Evaluation of the total sperm count within years did not show a significant difference as well (p=0.646; > 0.05) (Figure 3). Statistically significant differences were not noted in the changes seen in A (+4) motility (p=0.287; > 0.05), B (+3) motility (p=0.300; > 0.05) and D (+1) motility (p=0.741; > 0.05) values within years. C (+2) motility defines the non-progressive motility (5 μm/s) of the sperms and this motility data represents the most interesting parameter in this study. This parameter showed significant

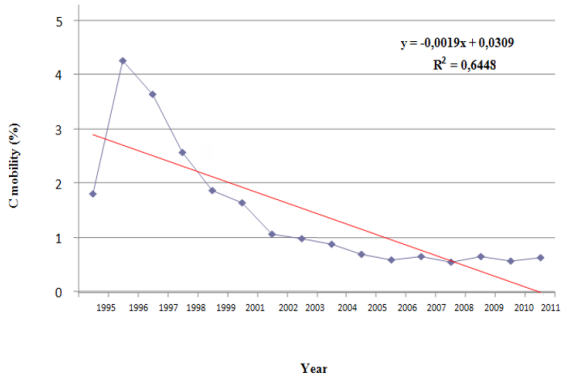

Figure 4. C mobility values between 1995 and 2011.

decrease in years, in all age groups as well as in the whole study ($p<0.05$) (Figure 4).

DISCUSSION

There is currently no extensive study in Turkey reporting the semen quality in men, even at a regional level. Moreover, it is difficult to find scientific information even on the mean sperm count of Turkish men. These result in suggestion of various ideas, based on no scientific grounds, about the fertility of the men living in Turkey. One of the main objectives of this study is to partially cover this lack of scientific information. Therefore a high number of subjects were included in this study. The World Health Organization (1992) states that the reference value for sperm concentration is 20 $x10^6$ spermatozoa/mL or more. Because of this reason, subjects with a sperm count lower than 20 $x10^6$/mL or higher than 250$x10^6$/mL were excluded and those older than 50 years of age were not included in the evaluation. Subjects aged 50 years or above were excluded from the study since semen quality in that age group could be negatively affected by age [15].

Mean sperm concentration was found to be 73.209.869±48.402.326/mL, considering all the years included in this study. We have compared this finding with the regional studies performed in Europe, such as France-Paris: 61$x10^6$/mL, Scotland-Edinburgh 74$x10^6$/mL, Finland-Turku 82$x10^6$/mL as well as United States of America including Columbia - Missouri 58.7$x10^6$/mL, New York 102.9$x10^6$/mL, Minneapolis - Minesota 98.6 $\times10^6$ /mL and Los Angeles-California 80$\times10^6$/mL [16,17].

Although sperm concentration and total sperm count were tended to decline in 1995-2011 period, the differences were not find statistically significant in this study. The decrease in sperm quality and count over the years may be attributed to two factors: effects of environmental factors, including endocrine disruptors and lifestyle changes such as increase in body mass index (BMI), stress, nutrition or infections [18,19]. Meta-analysis studies evaluate the semen quality data obtained for many years. Duration of the years evaluated in these studies can be as long as 50–60 years. Whereas some studies can include short-term results [17,20]. We also demonstrated that semen volume increased yearly by 0.31% within the years studied ($p>0.05$) and this result can be considered as another conclusion of this study. Although these results seem to be contradictory, similar results have been obtained in the studies performed within different geographical regions [21-23]. Recently decline trends of sperm concentration and semen quality have been observed in men of the general population in France [5] and Finland [6].

As this study is the first in Turkey presenting first values about semen quality in Turkish men, it is not possible to compare the results with previous values. Although these values do not represent the change in years, they are similar to our findings obtained in 2010. In a retrospective study with 296 infertile Turkish men rapidly progressing sperm ratio of the heavy smokers was found greater than that of the light smokers group ($p<0.05$). As people in this study were all infertile, no comparison was made between our results and results of that study [10]. On the other hand, although involving a very small group of subjects compared to the present study, Duydu et al., evaluated the semen parameters of 49 subjects in Bandırma-Turkey who were exposed to Boron and they have found the sperm concentration as 69.84$x10^6$ /mL, total sperm count as 223.59 $x10^6$ and sperm motility as 50.6% in their control group [13].

In practice, the overall interpretation of the findings of this study involves some difficulties. For example, interpretation of a

Table 1. Semen characteristics of 24693 Turkish man.

Year and age group	Abstinence period (days) (Mean±S.D)	Sperm concentration (10^6 mL^{-1}) (Mean±S.D)	Semen volume (mL) (Mean±S.D)	Total Sperm Count (10^6) (Mean±S.D)	Mobility				Sperm Progressive Mobility (A + B) (%)
					A(%)	B(%)	C(%)	D(%)	
1995 (n= 1657)	**4.23**	**84.98±56.37**	**4.14±1.68**	**300.48±251.36**	**37.9**	**26.2**	**1.8**	**33.9**	**64.1**
26-30 (n=44)	4	83.65 ± 57.27	2.91 ± 1.46	249.39 ± 223.69	40	25	1	33	65
31-35 (n=326)	4.29	85.63 ± 55.78	4.28 ± 1.84	351.72 ± 262.28	43	24	1	31	67
36-40 (n=569)	4.30	84.34± 56.14	4.2 ± 1.86	340.67± 255.45	40	26	2	33	66
41-50 (n=718)	4.36	85.09 ± 56.30	4.1 ± 1.86	337.64 ± 264.05	34	27	2	36	61
1996 (n= 1605)	**4.24**	**77.84±51.80**	**3.93±1.85**	**275.12±224.12**	**34.6**	**25.7**	**4.3**	**35.4**	**60.3**
26-30 (n=85)	4	82.50 ± 53.27	3.27 ± 1.74	275.95 ± 247.76	40	23	4	34	63
31-35 (n=368)	4.29	80.52 ± 52.30	3.91 ± 1.91	294.54± 220.88	35	25	5	35	60
36-40 (n=611)	4.31	77.12 ± 51.31	4.07 ± 1.95	295.53 ± 214.62	35	26	4	35	61
41-50 (n=541)	4.37	75.89 ± 50.35	3.9 ± 1.81	281.60 ± 213.23	33	26	4	37	59
1997 (n=1595)	**3.93**	**73.20±45.96**	**3.85±1.78**	**250.55±203.87**	**37.8**	**23.0**	**3.6**	**35.6**	**60.8**
18-25 (n=12)	3	65.09 ± 29.14	2.33 ± 2.07	135.11 ± 133.91	35	23	5	38	58
26-30 (n=104)	4	81.02 ± 53.62	3.81 ± 1.75	303.69± 256.16	43	20	3	34	63
31-35 (n=457)	4.19	72.24 ± 50.15	3.95 ± 1.69	271.98 ± 205.54	38	23	4	35	61
36-40 (n=560)	4.16	73.21 ± 49.58	3.87 ± 1.75	274.17± 216.10	38	23	4	36	61
41-50 (n=462)	4.30	72.56 ± 47.31	3.78 ± 1.65	267.78 ± 207.67	37	23	4	36	60
1998 (n=1734)	**3.92**	**68.73±46.74**	**3.96±1.64**	**253.97±200.98**	**39.2**	**22.9**	**2.6**	**35.3**	**62.1**
18-25 (n=25)	3	67.40 ± 48.93	3.12 ± 1.30	221.28 ± 212.76	39	23	3	35	62
26-30 (n=140)	4	72.27 ± 49.10	3.81 ± 1,72	258.87 ± 191.35	43	22	2	33	65
31-35 (n=592)	4.20	66.80 ± 42.91	4.1 ± 1.81	265.59 ± 198.18	40	23	3	35	63
36-40 (n=574)	4.19	69.51 ± 47.67	3.98 ± 1.72	266.30 ± 206.84	39	23	3	36	62
41-50 (n=403)	4.22	69.29 ± 45.13	3.82 ± 1.65	257.79± 195.78	38	23	3	36	61
1999 (n=2126)	**4.40**	**72.82±49.20**	**3.76±1.57**	**265.02±193.80**	**39.9**	**22.5**	**1.9**	**35.7**	**62.4**
18-25 (n=37)	5	89.56 ± 60.08	3.22 ± 1.44	290.79± 239.82	46	21	1	32	67
26-30 (n=280)	4	70.59 ± 41.58	3.63 ± 1.42	246.74 ± 165.85	42	22	2	34	64
31-35 (n=760)	4.33	71.49 ± 46.84	3.92 ± 1.71	265.29± 184.68	40	23	2	35	63
36-40 (n=623)	4.23	71.69 ± 47.03	3.70 ± 1.62	249.53± 173.59	40	22	2	37	62

41-50 (n=426)	4.46	76.83 ± 50.49	3.72 ± 1.67	272.73 ± 205.07	38	23	2	37	61
2001(n=1747)	**4.16**	**75.73±49.43**	**3.74±1.53**	**266.24±202.2**	**35.5**	**23.5**	**1.6**	**38.8**	**59**
18-25 (n=63)	4	76.11± 48.39	3.06 ± 1.33	226.59 ± 178.49	38	22	1	38	60
26-30 (n=420)	4	76.11 ± 51.43	3.89 ± 1.62	286.83 ± 216.48	36	24	2	38	60
31-35 (n=611)	4.22	75.18 ± 49.04	3.76 ± 1.56	274.61 ± 201.67	36	25	2	38	61
36-40 (n=397)	4.29	76.20 ± 50.71	3.66 ± 1.49	269.13 ± 210.38	36	24	2	39	60
41-50 (n=256)	4.33	75.59 ± 47.61	3.76 ± 1.65	274.03 ± 203.98	32	23	2	42	55
2002 (n=1981)	**4.18**	**72.29±47.31**	**3.39±1.49**	**233.24±183.77**	**38.0**	**23.3**	**1.1**	**37.6**	**61.3**
18-25 (n=65)	4	74.75 ± 45.30	2.97 ± 1.38	215.95 ± 158.97	39	22	1	38	61
26-30 (n=535)	4	71.03± 47.65	3.38 ± 1.49	233.34 ± 184.35	40	23	1	36	63
31-35 (n=707)	4.31	75.03± 50.48	3,4 ± 1.59	244.46 ± 195.40	38	23	1	38	61
36-40 (n=422)	4.22	70.09 ± 47.08	3.45 ± 1.58	235.62 ± 190.35	38	23	1	38	61
41-50 (n=252)	4.40	70.29± 46.07	3.37 ± 1.42	236.85 ± 189.82	36	24	1	39	60
2003 (n=1359)	**4.21**	**66.88±48.98**	**4.21±1.62**	**273.38±192.52**	**38.0**	**24,2**	**1.0**	**36.8**	**62.2**
18-25 (n=114)	4	69.99 ± 46.31	3.92 ± 1.59	265.91 ± 200.06	41	23	0	35	64
26-30 (n=413)	4	64.89 ± 64.89	4.17 ± 1.56	259.87 ± 163.18	39	24	1	36	63
31-35 (n=446)	4.24	65.19± 40.18	4.26 ± 1.64	262.92 ± 167.53	39	24	1	37	63
36-40 (n=244)	4.31	68.53± 45.82	4.23 ± 1.67	277.62 ± 208.17	36	25	1	37	61
41-50 (n=142)	4.50	72.62 ± 47.73	4.24 ± 1.68	300.57 ± 223.70	34	25	2	39	59
31-35 (n=592)	4.20	66.80 ± 42.91	4.1 ± 1.81	265.59 ± 198.18	40	23	3	35	63
36-40 (n=574)	4.19	69.51 ± 47.67	3.98 ± 1.72	266.30 ± 206.84	39	23	3	36	62
41-50 (n=403)	4.22	69.29 ± 45.13	3.82 ± 1.65	257.79 ± 195.78	38	23	3	36	61
2004 (n=1440)	**4.19**	**69.44±46.66**	**4.24±1.67**	**286.63±208.68**	**38.9**	**26.1**	**0.9**	**36.9**	**65**
18-25 (n=172)	4	71.20 ± 45.54	4.2 ± 1.46	283.68± 177.03	39	26	1	35	65
26-30 (n=498)	4	66.97 ± 44.40	4.44 ± 1.86	287.95 ± 219.88	37	26	1	36	63
31-35 (n=406)	4.18	69.40 ± 46.87	4.41 ± 1.77	289.88 ± 211.65	45	26	1	38	71
36-40 (n=243)	4.40	70.68 ± 47.61	4.24 ± 1.69	285.16 ± 210.41	36	26	1	38	62
41-50 (n=121)	4.37	74.66± 48.88	3.99 ± 1.61	286.49 ± 224.45	35	26	1	38	61
2005 (n=1430)	**4.17**	**75.42±50.21**	**3.88±1.74**	**281.03±220.02**	**42.6**	**22.5**	**0.9**	**36.9**	**65.1**
18-25 (n=265)	4	69.35 ± 46.06	3.98 ± 1.91	266.40 ± 212.78	44	22	1	34	66
26-30 (n=442)	4	76.16 ± 50.91	3.94 ± 1.79	288.01 ± 235.91	43	23	1	34	66
31-35 (n=388)	4.28	76.32± 49.02	3.79 ± 1.66	278.97 ± 212.58	43	22	1	34	65
36-40 (n=218)	4.29	78.46 ± 50.08	3.85 ± 1.73	290.21 ± 219.20	41	24	1	35	65
41-50 (n=117)	4.29	77.66 ± 55.01	3.81 ± 1.64	281.54± 219.65	40	23	1	37	63

31-35 (n=388)	4.28	76.32 ± 49.02	3.79 ± 1.66	278.97 ± 212.58	43	22	1	34	65
36-40 (n=218)	4.29	78.46 ± 50.08	3.85 ± 1.73	290.21 ± 219.20	41	24	1	35	65
41-50 (n=117)	4.29	77.66 ± 55.01	3.81 ± 1.64	281.54 ± 219.65	40	23	1	37	63
2006 (n=1566)	**4.16**	**72.09±47.83**	**3.69±1.63**	**261.79±206.26**	**42,6**	**22,5**	**0,7**	**34,2**	**65.1**
18-25 (n=300)	3.7	68.61 ± 41.32	3.67 ± 1.57	242.17 ± 163.34	44	22	0	33	66
26-30 (n=522)	4	70.29 ± 45.52	3.84 ± 1.74	262.03 ± 194.36	43	22	1	34	65
31-35 (n=383)	4.16	72.27 ± 47.65	3.61 ± 1.73	261.12 ± 221.82	41	23	1	36	64
36-40 (n=240)	4.55	76.32 ± 49.25	3.71 ± 1.57	279.76 ± 221.49	43	22	1	35	65
41-50 (n=121)	4.43	79.52 ± 55.41	3.38 ± 1.54	263.85 ± 230.32	41	23	1	35	64
2007 (n=1622)	**4.19**	**72.12±45.95**	**3.81±1.60**	**269.89±204.99**	**36.1**	**27.7**	**0.6**	**35.5**	**63.8**
18-25 (n=291)	4	73.38 ± 45.21	3.70 ± 1.68	273.13 ± 239.18	38	27	0	34	65
26-30 (n=560)	4	71.95 ± 44.26	3.87 ± 1.69	265.75 ± 180.90	37	27	1	35	64
31-35 (n=427)	4.10	72.64 ± 48.92	3.78 ± 1.57	265.66 ± 207.54	35	29	1	36	64
36-40 (n=221)	4.44	65.37 ± 41.76	3,93 ± 1.70	249.88 ± 183.88	34	28	1	37	62
41-50 (n=123)	4.44	80.18 ± 49.64	3.74 ± 1.40	295.01 ± 213.46	35	28	1	37	63
2008 (n=1400)	**4.22**	**71.86±47.19**	**4.25±1.83**	**291.12±208.65**	**36.7**	**26.3**	**0.5**	**36.3**	**63**
18-25 (n=243)	4	72.06 ± 48.97	4.55 ± 2.05	314.60 ± 247.08	39	25	0	35	64
26-30 (n=466)	4	71.40 ± 45.37	4.38 ± 1.64	295.59 ± 189.48	38	26	1	36	64
31-35 (n=399)	4.10	69.43 ± 43.02	4.04 ± 1.58	272.69 ± 202.59	36	28	0	36	64
36-40 (n=186)	4.40	76.44 ± 48.91	4.23 ± 2.09	301.77 ± 206.37	35	26	1	38	61
41-50 (n=106)	4.60	74.40 ± 49.71	3.85 ± 1.80	270.93 ± 197.77	34	27	1	38	61
2009 (n=1365)	**4.30**	**72.52±48.66**	**4.23±2.69**	**287.48±262.29**	**38.1**	**25.5**	**0.7**	**35.2**	**63.6**
18-25 (n=217)	4	66.24 ± 43.81	4.32 ± 1.81	276.43 ± 223.44	38	26	1	35	64
26-30 (n=443)	4	76.34 ± 49.87	4.35 ± 6.70	317.26 ± 441.29	40	25	1	35	65
31-35 (n=394)	4.31	71.40 ± 48.65	4.25 ± 1.70	288.05 ± 200.73	39	26	0	34	65
36-40 (n=197)	4.34	73.09 ± 49.23	4.04 ± 1.67	283.93 ± 225.92	36	26	1	37	62
41-50 (n=114)	4.89	72.48 ± 51.77	3.87 ± 1.57	271.73 ± 220.09	34	27	1	39	61
2010 (n=1408)	**4.16**	**69.60±45.81**	**4,16±1.79**	**270.93±184.88**	**39.3**	**25,6**	**0,7**	**34,6**	**64.9**
18-25 (n=185)	4	73.14 ± 49.59	4.19 ± 1.88	291.14 ± 216.61	43	25	0	32	68
26-30 (n=454)	4	68.99 ± 45.72	4.24 ± 1.75	274.17 ± 185.42	39	26	1	34	65
31-35 (n=441)	4.10	68.65 ± 44.99	4.22 ± 1.77	278.54 ± 198.07	40	25	1	35	65
36-40 (n=199)	4.45	68.53 ± 44.28	4.13 ± 1.85	256.94 ± 155.22	38	26	0	36	64
41-50 (n=129)	4.27	71.54 ± 44.49	3.73 ± 1.70	253.88 ± 169.10	35	25	1	39	60
2011 (n=658)*	**4.12**	**75.34±52.12**	**4.10±0.1.75**	**286.76±203.1**	**39.4**	**24.6**	**0.8**	**35.4**	**64**
18-25 (n=91)	4	75.72± 51.47	4.04 ± 1.75	270.71 ± 195.59	44	24	0	32	68
26-30 (n=176)	4	70.56 ± 49.90	4.33 ± 1.65	288.03 ± 188.26	39	25	1	35	64

Table 1. Semen characteristics of 24693 Turkish man.

Characteristic	
Semen collection time interval	January 1995 to June 2011
Evaluated sperm count range	20x10^6/mL-250x10^6/mL
Semen volume(mL) (mean ± SD)	3.93±1.9
Sperm concentration (x10^6/mL) (mean ± SD)	73.2±48.4
Total sperm count (x10^6) (mean ± SD)	276.4±214.7
Mobility (%A)	38.4
Mobility (%B)	24.5
Mobility (%C)	1.5
Mobility (%D)	35.8
Age (years) (mean ± SD)	33.8±5.7
Abstinence period (days) (mean ± SD)	4.2±1.0

strong decrease in parameters such as sperm concentration, total sperm and C(+2) motility would be complete if toxicological data regarding smoking, alcohol consumption, chemical exposure at the workspace [24] and continuous drug use were available [25]. Because certain chemicals, foremost endocrine disrupters, are held responsible for the deterioration and decrease in semen quality observed in various geographical regions [7]. Substantial amount of data shows that the chemicals that parents were exposed before fertilization, chemicals that mother was exposed during intrauterine period and postnatal exposures underlie some of the present adulthood diseases [2,26]. Considering semen quality might also be affected by such exposures, importance of having the information that allows personalized risk analysis cannot be ignored. Therefore, the findings of this study can be considered as an initial report of baseline values and it is very important that this information is obtained in the further studies. We believe that inclusion of information allowing evaluation of toxicological risk assessments in the patient admission forms used in infertility clinics and analyzing laboratories might be useful within this scope.

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