Semen analysis in “urology-naïve” patients: a chance of uroandrological screening in young male

Stefano Toso (✉ Stefano.toso92@gmail.com)  
University of Modena e Reggio Emilia

Marco Ticonosco  
University of Modena e Reggio Emilia

Salvatore Rabito  
University of Modena e Reggio Emilia

Maria Chiara Sighinolfi  
University of Modena e Reggio Emilia

Riccardo Ferrari  
University of Modena e Reggio Emilia

Vincenzo Rochira  
Azienda Ospedaliero-Universitaria of Modena

Daniele Santi  
Azienda Ospedaliero-Universitaria of Modena

Tommaso Trenti  
Ospedale S. Agostino-Estense

Luigi Montano  
Local Health Authority (ASL) Salerno

Bernardo Rocco  
University of Modena e Reggio Emilia

Salvatore Micali  
University of Modena e Reggio Emilia

Research Article

Keywords: Semen analysis, screening, young male patients, infertility, ecofood fertility

Posted Date: April 23rd, 2021

DOI: https://doi.org/10.21203/rs.3.rs-405974/v1

License: ✉ This work is licensed under a Creative Commons Attribution 4.0 International License.  
Read Full License
Abstract

**Background** Differently from female population, where gynaecological examinations begin during puberty, few men decide to be visited by urologist in youth. Given the participation to the Ecofood-Fertility trial, our department had the opportunity to screen young males supposedly healthy.

**Results** From January 2019 to July 2020, we evaluated 81 patients with sperm analysis, blood analysis and uro-andrological examination. Inclusion criteria were age 18-40 and absence of previous urological disease (urology-naïve). The primary endpoint of the study is to record uro-andrological diseases occasionally discovered during examination in asymptomatic young men.

Mean age was 25.7 years (range 19-36); average testicular volume was 17.4 ml (range 12-22 ml). 74.1% reported abnormal semen analysis: 43 cases of teratozoospermia, 12 astenozoospermia, 6 oligozoospermia and 2 azoospermia were discovered. 2/58 patients were diagnosed with hypogonadism. 2 cases with suspicious testicular mass resulted in testicular cancer. 14 suspected varicoceles and 6 patients with mild sexual dysfunctions were managed.

**Conclusion** An uro-andrological evaluation of young asymptomatic males allowed for the prompt diagnosis of different urological conditions, including cancerous ones, in our series. Despite debatable, urological counselling with physical examination, semen-analysis and a laboratoristic-profile could be useful and cost effective in order to enhance males’ health.

**Background**

Nowadays the first examination as urological screening is recommended around the age of 50[1]; in clinical practice it is not common undergoing urological visit in apparently healthy young male.

Unlike the female population, where gynaecological checks begin during puberty, it is not common in young male patients to be visited by an urologist even if there are many typical urological diseases regarding that age, such as varicoceles, sexual related infection, infertility, testicular cancer [2, 3].

Relevance and clinical attention has been given to the evaluation of general health in relation to male reproductive system: unfertile patients emerged to be unhealthy about their general status compared to fertile one [4].

We are participating to a multicentre study based in Salerno, called Ecofood Fertility, which aim is to evaluate the role of human semen as an early biomarker of pollution in healthy men living in various areas with different environmental impact. So far, first results are supporting the belief that the human semen is a sentinel biomarker of environmental exposure [5].

First level exams required for the study are the semen analysis, the blood analysis and the uro-andrological examination in urological naive and healthy patients who never underwent urological examination before.
Thanks to this opportunity, we had the chance to evaluate the role of the sperm analysis as an indicator of urological health and the possibility to physically examine patients who otherwise would have never undergone an urological control.

The hypothesis is that the sperm analysis is a simple, easy and cheap exam that can be used by clinicians to evaluate the general status of urological health in young patients.

**Methods**

We examined 81 patients from January 2019 and July 2020, with sperm analysis, blood analysis and uro-andrological examination. The study has been approved by local ethic committee (Area vasta Emilia nord, prot. n. 0014975/18). All the included patients signed an informed consent to participate to the study.

Parameters to participate to the study were age between 18 to 40; no previous urological disease, non-smoker. From 3 to 5 days of sexual abstinence before collecting semen was necessary.

Age, weight, height, body mass index (BMI), waist and hip circumference were collected for each patient enrolled.

Semen analysis were performed according to World Health Organization (WHO) guidelines. All samples were analysed with optical microscope LEICA DM2000LED.

Blood examination were performed, in order to collect TSH (microIU/mL), FSH (IU/L), LH (IU/L), testosterone (ng/mL), oestradiol (pg/mL), haemoglobin (g/dL), white blood cells (n/mm3), creatinine (mg/dl), ALT (u/L), AST (U/L), G-GT (U/L), total cholesterol (mg/dL), triglycerides (mg/dL).

All patients underwent andrological physical examination, valuating any abnormalities in external genitalia and reporting testicular volume.

An accurate uro-andrological clinical history has been collected for every patient, and each of them answered two questionnaires about their physical activity and diet habits related to their recent past.

Correlations analyses were performed considering all anthropometrical semen, blood and hormone parameters using Spearman Rho correlation analysis. Since 22 variables were considered, after Bonferroni analysis, p-value < 0.002 were considered significantly.

All methods were carried out in accordance with relevant guidelines and regulations

**Results**

The patients had a mean age of 25.7 years (range 19–36); there were no statistically differences found in the population studied in terms of BMI, hip and waist circumference.
Average testicular volume was 17,4ml (range 12-22ml).

A total of 81 semen analysis has been performed. Two patients resulted in azoospermia; 7 in oligozoospermia (8,8%); 17 in astenozoospermia (21%); 60 in teratozoospermia (74,1%).

In total 74,1% of the patient resulted with alteration in the semen analysis. (Table 1).

| Number | Minimum | Maximum | Mean | Standard deviation |
|--------|---------|---------|------|--------------------|
| pH     | 81      | 3.0     | 8.08 | 8.05               | 0.66               |
| Vol    | 81      | 1.0     | 10.0 | 3.70               | 1.83               |
| Sperm Concentration | 80      | 0       | 270.0| 71.35              | 59.15              |
| Total Sperm Number | 80      | 0       | 770.0| 238.78             | 202.73             |
| Normal forms | 81      | 0       | 20   | 3.95               | 3.19               |
| Progressive motility | 81      | 0       | 82   | 48.41              | 21.36              |
| Non progressive motility | 81     | 0       | 97   | 55.33              | 21.60              |
| Leucocytes | 81      | 0       | 10.0 | 0.30               | 1.39               |

A total of 81 blood analysis has been performed: two patients with suspected hypogonadism, classified as serum testosterone level below 3 ng/ml, have been found;

All subjects went under physical examination; 14 suspected varicocele at the physical examination have been found.

2 patients with suspected testis nodularity has been sent to further investigations, resulted in testicular cancer.

6 patients resulted in sexual dysfunctions, basically anxiety-related.

No statistically correlation results were found analysing lifestyle and diet habits questionnaire.

**Discussion**

The majority of the young patients usually does not know there is a definite medical figure on uro- andrological diseases, or they simply feel uncomfortable talking about andrological issues.

Moreover, most of the young patients do not have a specific figure whom they can rely on about sexual education and sexual healthiness [6].
Alteration of fertility or infertility is an important but underrated health problem among the young male population. Indeed, it is well known nowadays the existence of a reduced fertility even at a young age [7].

Sometimes it could be related to urological problems, in other cases due to endocrinological issues, sometimes unexplained [8].

A recent systematic review [9] analyzed the lack of awareness of young patients about uro-andrological disease, assessing the importance of clinicians to instruct young men to familiarise with urological issues (i.e. testicular self examination).

Following our participation to the multicentric study “Ecofood Fertility” and the consequent sampling of seminal fluid and blood tests from each patient attending the study, we carefully analysed the results. What we found was particularly interesting, especially related to the fact that all patients were “urology naive”, volunteers and asymptomatic.

Concerning fertility, only 26% of all patients presented semen analysis with normal parameters; the remaining population turned out having alterations in motility, morphology or concentration of spermatozoa according to WHO parameters. Reference values defined by WHO have changed during decades, lowering its parameters through the years [10].

An interesting meta-analysis, collecting data from 1981 until 2013, described a progressive reduction of male fertility through the years [7]. The authors collected data from studies referred to male infertility related to any kind of pathological disorders.

The main difference with our study regards the selection of patients; as a matter of fact, in our study, following the indication of the pilot project, each one of our patients must be “uro-andrological naive” (defined as not previously aware of andrological problems).

This selection helped us to find patients with a prominent alteration in semen analysis and to give them a medical treatment and further tests to better frame their problem, even considering cryopreservation.

It is still not clear how to behave with asymptomatic patients with a mild alteration of the spermiogram who are not trying to have children [11]. Further studies should be headed in this direction.

Patients diagnosed with suspected left varicocele at the physical examination received the indication of a testicular ECD-US for eventually confirm the diagnosis and indication for surgical treatment.

As suggested by EAU guidelines, surgical treatment is needed in varicoceles with alteration on semen analysis [12;13].

To avoid overtreatment of varicoceles, the availability of semen analysis during first urological visits allows urologists to promptly direct patients to the correct diagnostic and therapeutic choice.
Great relevance, aside from fertility patterns, was given to casual detection of two testicular cancers; patients already knew about their nodularity, but underestimated it.

This result may be surprising but not unexpected considering testicular cancers as a tumour affecting young ages [18].

Both of them went under orchifunicolectomy; a classic seminoma and a mixed non seminoma tumour were confirmed at the definite histology. They are now under oncological follow up.

In case of detection of benign testis tumor in patients with altered fertility, evaluated with semen analysis, testis sparing surgery is a possibility of preserving as more as reproductive function of the organ possible.[19].

Two patients were found with possible hypogonadism after hormonal analysis, and they were addressed to accomplish endocrinological further insights.

Erectile disfunction (ED) in young population is recently gaining attention; it is reported up to 25% of patient from 18 to 40 years suffered at least one episode of ED in life [14];

Imperative is to define eventual organic or psychological cause [15]

Widespread of pornography could have a role [16] in young patients suffering ED, especially to psychological-related.

Role of andrological visit in psychogenic ED is been described in literature [17]

Among our patients, 6 males had the opportunity to discuss their sexual issues (mild erectile dysfunction related to anxiety pattern) for the first time with a qualified figure, finally setting aside their embarrassment. In this case, no pharmacological treatment was necessary; only behavioural therapy or a modification of their lifestyle were sufficient, based on their precise medical history.

Having the chance to talk to a specific professional figure about “taboo” questions certainly helped with therapy and allowed the resolution of the sexual matter.

The limitations in our study were certainly associated to the risk of overdiagnosis in impaired fertility: at the moment of the analysis, few patients already looked for children; for a patient, this could lead to an anxiety state, while he does not even tried to have babies or without diagnosis of couple infertility.

Our study is currently running; increasing numerosity could further confirm our hypothesis of a general urological screening in young male patients.

In our opinion, the cost of a semen analysis (aside from blood and hormonal analysis, which could be done as a II level evaluation), together with an uroandrological examination can be sustainable for the
sanitary system, even more if it could lead to a general adjustment of uroandrological health in patients who otherwise could not be aware about their condition and the pathologies they suffer from.

**Conclusion**

In our experience, an urological examination with an associated semen analysis, in young patients, could be useful to safeguard general urological health and may allow young man discover the existence of a reference figure for the approach to their fertile sexual life. The use of the spermiogram allows fertility evaluation and could confirm and better frame any associated co-pathologies, thanks to its low cost and simplicity of execution. Further studies focusing on large-scale feasibility are needed.

**Declarations**

**Ethics approval and consent to participate**

The study has been approved by local ethic committee (Area vasta Emilia nord, prot. n. 0014975/18). Each patients signed an informed consent paper to participate.

All methods were carried out in accordance with relevant guidelines and regulations

**Consent for publication**

NA.

**Availability of data and materials**

The data that support the findings of this study are available on request from the corresponding author [ST].

**Competing interests**

All authors declare no competing interests.

**Funding**

No funding was needed or requested for this study.

**Authors’ contributions**

Toso S., Ticonosco M., S.Micali, L. Montano contributed to the design and implementation of the research, D. Santi, V. Rochira contributed to the analysis of the results. Toso S. Ticonosco M. Rabito S wrote the main manuscript, B.Rocco, MC Sighinolfi, R. Ferrari, Trenti T helped supervise the project. All authors discussed the results and contributed to the final manuscript.

**Acknowledgements**
Authors would like to thank to the opportunity to be part of the Ecofood-Fertility project.

References

1. Carlsson, S., Assel, M., Ulmert, D., Gerdtsson, A., Hugosson, J., Vickers, A., & Lilja, H. (2017). Screening for Prostate Cancer Starting at Age 50-54 Years. A Population-based Cohort Study. *European urology, 71*(1), 46–52. https://doi.org/10.1016/j.eururo.2016.03.026

2. Kusler, K. A., & Poynter, J. N. (2018). International testicular cancer incidence rates in children, adolescents and young adults. *Cancer epidemiology, 56*, 106–111. https://doi.org/10.1016/j.canep.2018.08.002

3. Alsaikhan B, Alrabeeah K, Delouya G, Zini A. Epidemiology of varicocele. Asian J Androl. 2016 Mar-Apr;18(2):179-81. doi: 10.4103/1008-682X.172640. PMID: 26763551; PMCID: PMC4770482.

4. Ventimiglia E, Montorsi F, Salonia A. Comorbidities and male infertility: a worrisome picture. Curr Opin Urol. 2016 Mar;26(2):146-51. doi: 10.1097/MOU.0000000000000259. PMID: 26765042.

5. Vecoli, C., Montano, L., Borghini, A., Notari, T., Guglielmino, A., Mercuri, A., Turchi, S., & Andreassi, M. G. (2017). Effects of Highly Polluted Environment on Sperm Telomere Length: A Pilot Study. *International journal of molecular sciences, 18*(8), 1703. https://doi.org/10.3390/ijms18081703

6. Vecoli, C., Montano, L., Borghini, A., Notari, T., Guglielmino, A., Mercuri, A., Turchi, S., & Andreassi, M. G. (2017). Effects of Highly Polluted Environment on Sperm Telomere Length: A Pilot Study. *International journal of molecular sciences, 18*(8), 1703. https://doi.org/10.3390/ijms18081703

7. Levine, H., Jørgensen, N., Martino-Andrade, A., Mendiola, J., Weksler-Derri, D., Mindlis, I., Pinotti, R., & Swan, S. H. (2017). Temporal trends in sperm count: a systematic review and meta-regression analysis. *Human reproduction update, 23*(6), 646–659. https://doi.org/10.1093/humupd/dmx022

8. WHO Manual for the Standardized Investigation and Diagnosis of the Infertile Couple. (2000), Cambridge University Press: Cambridge.

9. Saab, M. M., Davoren, M., Murphy, A., Murphy, D., Cooke, E., Landers, M., Fitzgerald, S., Richardson, N., Rovito, M., Von Wagner, C., Murphy, M., Dahly, D., & Hegarty, J. (2018). Promoting men's awareness, self-examination, and help-seeking for testicular disorders: a systematic review of interventions. *HRB open research, 1*, 16. https://doi.org/10.12688/hrbopenres.12837.2

10. Cooper, T. G., Noonan, E., von Eckardstein, S., Auger, J., Baker, H. W., Behre, H. M., Haugen, T. B., Kruger, T., Wang, C., Mbizvo, M. T., & Vogelsong, K. M. (2010). World Health Organization reference values for human semen characteristics. *Human reproduction update, 16*(3), 231–245. https://doi.org/10.1093/humupd/dmp048

11. Milardi, D., Grande, G., Sacchini, D., Astorri, A. L., Pompa, G., Giampietro, A., De Marinis, L., Pontecorvi, A., Spagnolo, A. G., & Marana, R. (2012). Male fertility and reduction in semen parameters: a single
tertiary-care center experience. *International journal of endocrinology*, 2012, 649149. https://doi.org/10.1155/2012/649149

12. Baazeem, A., Belzile, E., Ciampi, A., Dohle, G., Jarvi, K., Salonia, A., Weidner, W., & Zini, A. (2011). Varicocele and male factor infertility treatment: a new meta-analysis and review of the role of varicocele repair. *European urology*, 60(4), 796–808. https://doi.org/10.1016/j.eururo.2011.06.018

13. Pastuszak, A. W., Kumar, V., Shah, A., & Roth, D. R. (2014). Diagnostic and management approaches to pediatric and adolescent varicocele: a survey of pediatric urologists. *Urology*, 84(2), 450–455. https://doi.org/10.1016/j.urology.2014.04.022

14. Capogrosso, P., Colicchia, M., Ventimiglia, E., Castagna, G., Clementi, M. C., Suardi, N., Castiglione, F., Briganti, A., Cantiello, F., Damiano, R., Montorsi, F., & Salonia, A. (2013). One patient out of four with newly diagnosed erectile dysfunction is a young man–worrisome picture from the everyday clinical practice. *The journal of sexual medicine*, 10(7), 1833–1841. https://doi.org/10.1111/jsm.12179

15. Rastrelli, G., & Maggi, M. (2017). Erectile dysfunction in t and healthy young men: psychological or pathological?. *Translational andrology and urology*, 6(1), 79–90. https://doi.org/10.21037/tau.2016.09.06

16. Park, B. Y., Wilson, G., Berger, J., Christman, M., Reina, B., Bishop, F., Klam, W. P., & Doan, A. P. (2016). Is Internet Pornography Causing Sexual Dysfunctions? A Review with Clinical Reports. *Behavioral sciences (Basel, Switzerland)*, 6(3), 17. https://doi.org/10.3390/bs6030017

17. Cavallini G. (2017). Resolution of erectile dysfunction after an andrological visit in a selected population of patients affected by psychogenic erectile dysfunction. *Asian journal of andrology*, 19(2), 219–222. https://doi.org/10.4103/1008-682X.172646

18. Smith, Z. L., Werntz, R. P., & Eggener, S. E. (2018). Testicular Cancer: Epidemiology, Diagnosis, and Management. *The Medical clinics of North America*, 102(2), 251–264. https://doi.org/10.1016/j.mcna.2017.10.003

19. De Stefani, S., Isgrò, G., Varca, V., Pecchi, A., Bianchi, G., Carmignani, G., Derchi, L. E., Micali, S., Maccio, L., & Simonato, A. (2012). Microsurgical testis-sparing surgery in small testicular masses: seven years retrospective management and results. *Urology*, 79(4), 858–862. https://doi.org/10.1016/j.urology.2011.12.039