

# 58 cases of sexual violence bearing forensic interest: congruence between the victim's report and the data from laboratory analyses

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**Abstract** The assistance provided by specialised healthcare personnel to victims of a sexual violence cannot focus just on the clinical intervention appropriate for the lesions suffered by the patient, but must also take legal and forensic needs into account. Anamnestic data represents a crucial step towards the finding of forensic evidence. Our retrospective study aims to analyse the congruence between verbal reports from abused women and the laboratory data to the end of identifying ways for enhancing the gathering of anamnestic data. We considered 960 medical records related to sexual violence that reached the Rape Centre “Soccorso Violenza Sessuale” of Turin between 2003 and 2013. Having consulted the register of evidence, we selected the cases for which the local judicial authority had asked for expert advice on biological material. The selected cases have been gathered in two different categories depending on whether the victim could or could not recall the events. Then, we looked at the results of the cytological analysis performed to identify the presence of sperm cells, at the results of the body fluid identification, and at the results of the DNA quantitation. Our findings strongly suggest

that forensic investigations should be carried out independently from the presence of memories of the traumatic events on the victim's part. Moreover, they suggest that forensic investigations should also be pursued in the presence of a negative cytologic examination.

**Keywords** Sexual violence · Medical history · Spermatozoa detection · Forensic genetics

## Introduction

Violence against women is “gender-based violence” and recognised as a form of human rights abuse. It is a violation of human dignity and can violate the right to live in the worst possible way. Violence against women exists in every society and includes different forms of physical, sexual, psychological, economic, and cultural abuse. However, despite its scale and social impact, it remains largely under-reported and relatively under-researched. Whereas violence against women has always existed, it is only in the last two decades that the international community has begun to highlight the problem. In 2014, the results of a survey based on interviews with 42,000 women throughout the European Union showed that 33% of women had experienced physical and/or sexual violence since they were 15 and 22% had experienced physical and/or sexual violence by a partner since the same age [1, 2].

In hospitals, the receiving of women who have suffered some form of violence is a fundamental moment that requires a high level of professionalism. Healthcare professionals must listen and gather useful information for treatment as well as they cannot focus just on the clinical intervention, but must also take legal and forensic needs into account [3]. Protocols by the Italian Association of Gynaecologists [4, 5] and the Group of Italian Forensic Geneticists [6] highlight the

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importance of collecting medical history to guide doctors in retrieving biological material on the victim's body. This means that case histories represent a crucial step towards finding forensic evidence.

Taking inspiration from a study carried out by Anna Aprile and collaborators [7], we evaluated the congruence between medical histories and laboratory data of abused women in order to verify how stories and cytological examination results should be taken into account by judicial authorities when deciding whether or not to proceed with forensic genetic investigations to identify perpetrators.

## Materials and methods

The present retrospective study is based on cases recorded in the Rape Centre “Soccorso Violenza Sessuale”<sup>1</sup> (“Sexual Violence Relief”, which from hereon will be referred to as the SVS) at Sant’Anna Hospital in Turin, and in the Laboratory of Forensic Genetics at the University of Turin.

We considered 960 medical records related to sexual violence which reached the SVS between 2003 and 2013. Having consulted the register of evidence acquired during the visit to the SVS and preserved at the Civic Morgue of Turin, we selected 73 medical records related to cases for which the local judicial authority had asked for expert advice on biological material (e.g. oral, vaginal, rectal and cutaneous swabs, and clothing). We could not find complete documentation related to the dynamic of nine incidents of reported abuse, because in these cases victims were treated in hospitals other than Sant’Anna, so we did not have their medical records to analyse. Furthermore, in only 58 cases was it possible to retrieve the results of forensic genetic examinations requested by judicial authorities. Five cases were not included, as in two of them the analyses were carried out on abortive material, and in the remaining three, analyses were performed on objects such as condoms.

Therefore, we analysed 53 incidents and for these cases we looked at the laboratory analysis results of:

- the cytological examination performed on thin prep to identify the presence of sperm cells [8];
- the body fluid identification obtained by immunochromatography aimed at identifying the presence of semen, which was carried out using RSID semen [9] and PSA Semiquant kits [10];
- the DNA quantitation performed with realtime PCR [11].

<sup>1</sup> The SVS is one of the two Italian institutes that are open 24 h, 7 days a week. It intervenes during emergencies and in the later stages of traumatic events caused by sexual assault or abuse during pregnancy. The institute takes care of women over the age of 14 with a multidisciplinary team, made up of gynaecologists, midwives, psychologists, social workers, and medical examiners.

While cytologic examinations were performed in a single laboratory, body fluid identification and DNA quantitation were carried out in 48 of 53 cases at the Laboratory of Forensic Genetics of Turin, and of the remaining cases, 4 were analysed at the Biology Section of the “Reparto Carabinieri Investigazioni Scientifiche di Parma” and 1 at a private laboratory in Bologna.

## Results

The analysis of the 960 medical records related to sexual violence that reached the SVS between 2003 and 2013 highlights that there has been a steady increase of access to the SVS. In the last 7 years the numbers have stabilised at around 90 to 110 cases per year.

However, the court ordered identification analyses of evidence gathered during visits for only 7.6% of cases (Fig. 1).

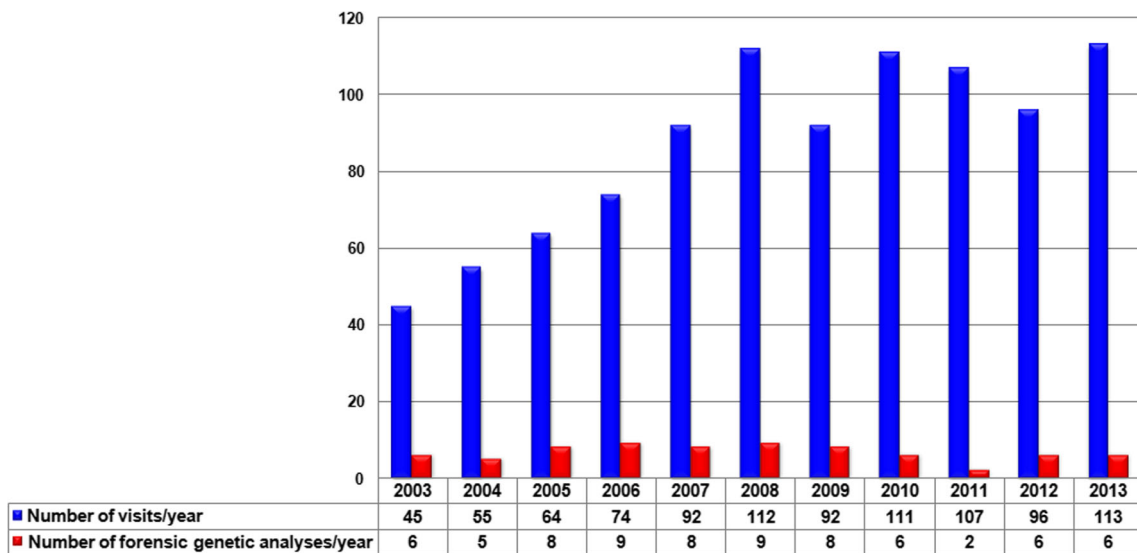
Of the 64 analysed incidents for which it was possible to find the medical records, we considered:

- 1) the elapsed time between the crime and the medical visit: 74% of women presented themselves within 24 h, 8% within 1 week and 6% after more than 15 days;
- 2) the age of the women: most of the women (42%) were aged between 18 and 25 (Fig. 2);
- 3) the nationality of the women: roughly half of the abused women were foreign but, if we analyse for age, 75% of the underage women were foreign, while 75% of women over the age of 35 were Italian.

With regard to the 53 cases for which we found the results of the laboratory analyses, the cytological examination was not carried out in only 7 of the 53 cases, while the body fluid identification was not carried out in 18 of 53. The DNA quantitation was performed in all 53 cases.

We then divided these 53 cases into two different categories on the basis of whether the victims recalled (27 of 53) or could not recall (26 of 53) what had happened, and discussed the results of the laboratory analyses.

Table 1 shows the results obtained for cases in which women recalled incidents of abuse: 7 cases out of 27 showed a positive result in cytologic examinations. Of these 7 cases, 3 were subjected to fluid identification with a positive result for semen. The remaining 4 were directly quantified. The quantitation gave a positive result for the presence of male DNA in all 7 cases. In 14 cases, despite a history of sexual violence, cytology failed. In 9 of these 14 cases, semen was not found and in 5 cases analysis was not conducted. The quantitation of the 14 cases with a negative cytologic examination results revealed the presence of male DNA in 2 cases. Finally, in 6 cases, the cytologic examination was not carried out and fluid



**Fig. 1** Number of visits per year at the SVS related to the number of forensic genetic analyses performed per year

identification was positive in 4 cases and negative in 2. Quantitation showed the presence of male DNA in the 4 cases positive for semen.

Alternatively, Table 2 shows the results of laboratory tests carried out in cases in which women could not recall the violence. Cytology was positive in 14 cases out of 26, and for these 14 cases, quantitation showed the presence of male DNA in 13 cases. Conversely, when cytology was negative, the fluid identification did not show the presence of sperm in the evidence in 8 cases, and in 2 cases the survey was not conducted. The quantitation of the 10 cases with negative cytology showed the presence of male DNA in only 2 cases.

**Discussion**

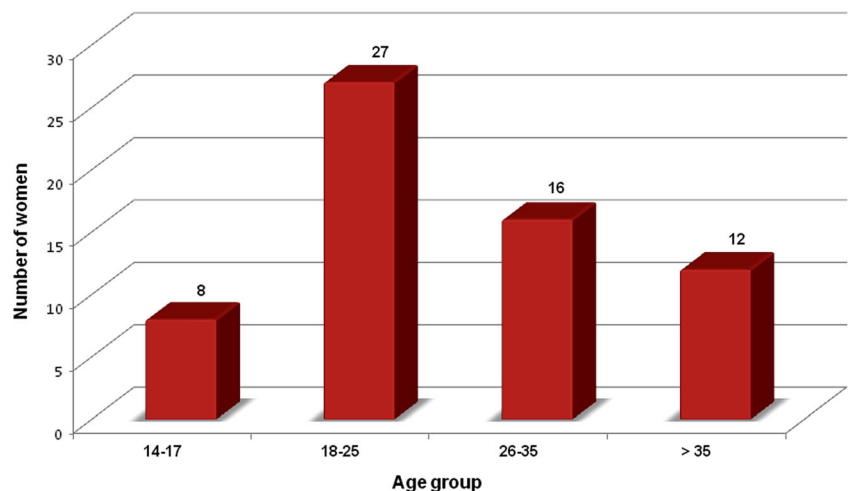
The retrospective study allows some considerations. First of all, there was an increase in the number of women who have

turned in the years to the Centre “Soccorso Violenza Sessuale” at Sant’Anna Hospital probably attributable to a greater awareness by victims and the desire to open up about what happened, rather than an actual increase in the violence against women. As a matter of fact, the ISTAT report on the analysis of violence against women in Italy, conducted in 2014, points out that even if violence against women is a large and widespread phenomenon, physical or sexual violence has gone from 13.3% in 2006 to 11.3% [12].

With regard to the nationality and age of the women analysed in our study, there is an overlap with the ISTAT survey data quoted above.

Comparing the number of admissions to the Centre SVS with the number of cases for which the judicial authorities have requested an in-depth forensic genetic analysis, the study shows that, over the years, there has been a reduced demand for such laboratory investigations (13.3% in 2003 compared to 5.3% in 2013). Even though health personnel of the SVS

**Fig. 2** Age of the victims



**Table 1** Results of the laboratory analyses when women recalled the sexual violence

	Women did not recalled incident (27/53)	Positive sperm identification	Negative sperm identification	Fluid identification not performed	Male DNA at quantitation
Positive cytologic examination	7/27	3/7	0/7	4/7	7/7
Negative cytologic examination	14/27	0/14	9/14	5/14	2/14
Cytologic examination not performed	6/27	4/6	2/6	0/6	4/6

have constantly continued to report cases of violence (data not shown), this reduction could be due to an incorrect interpretation by the judicial authorities of the results obtained with cytologic examinations performed to identify the presence of sperm cells. Indeed, it is a common belief that, in the face of the failure to observe spermatozoa, male genetic profiles could not be isolated from biological material found in evidence. For this reason, genetic-forensic investigations are no longer required, even if new technologies and new analytical strategies allow to type genotypes/haplotypes useful for identification even from a few cells (touch DNA) [13]. Our findings suggest just that analysing all the cases where cytologic examinations was negative, and it was possible to quantify male DNA useful for the study of DNA polymorphisms in 4 cases out of 24 total.

Also, we consider important to highlight that, in more than half of the analysed samples in this study, the characterisation of body fluids was not conducted for semen nor for other biological fluids, independently of the outcome of the cytologic examination. This fact could potentially prevent a complete understanding of the assessment of the collected data with the case histories and, therefore, establishing the dynamic of the event in question, especially useful in those cases in which the victim does not remember what happened.

The results of our work highlight a good correlation between the data obtained from laboratory tests and those expected according to the story of victims. The discordant cases may due to the fact that the visit, with the simultaneous

collection of biological samples, was performed after some time after the violence (in four cases the visit was conducted after 15 days and in six cases in a period between 1 and 6 days). Another hypothesis to be considered may be an inaccurate narrative or a story not consistent with reality due to considerable emotional stress, as well as physical, of the victim. So, it can happen that, during the interview with the medical staff, important details regarding the abuse are omitted or altered because of shame or loss of memory, as suggested by literature [7].

In regard to the 26 cases in which women did not remember the incident, male DNA was identified in more than half of the cases (15/26). This underscores the importance of carrying out forensic genetic investigations even in cases in which the story is not accurate or there is a true amnesia for what happened, in order to type any male genetic profile and thus identify perpetrators.

## Conclusions

Our study has pointed out first of all that collecting medical history is a crucial moment in dealing with the victim of violence, as this can decide on the subsequent steps also geared at collecting evidence. The health personnel's preparation and increased awareness are therefore essential in order to collect all relevant information to understand what happened and to identify perpetrators. Better preparation of health personnel

**Table 2** Results of the laboratory analyses when women did not recall the sexual violence

	Women did not recalled incident (26/53)	Positive sperm identification	Negative sperm identification	Fluid identification not performed	Male DNA at quantitation
Positive cytologic examination	14/26	7/14	0/14	7/14	13/14
Negative cytologic examination	10/26	0/10	8/10	2/10	2/10
Cytologic examination not performed	1/26	0/1	1/1	0/1	0/1

could also allow to identify victims of violence, who use the health services at least three times more than the rest of the population, as reported in literature [14–16].

Moreover, the study suggests that, in parallel with the training of health personnel, a more in-depth training of judicial authorities is needed in order to not hinder the efforts that health professionals employ during care and visits to victims of abuse (on average a visit to the Centre SVS takes 3–4 h). Moreover, it is necessary to recognise the great effort of a woman to undergo the examination and evidence collection, often a short time since having suffered violence.

**Compliance with ethical standards** The authors declare that the present study comply with the current Italian laws.

**Conflict of interest** The authors declare that they have no conflict of interest.

## References

1. WHO (2002) World report on violence and health. [http://www.who.int/violence\\_injury\\_prevention/violence/world\\_report/en/](http://www.who.int/violence_injury_prevention/violence/world_report/en/)
2. Fra-European Union Agency for Fundamental rights (2014) Violence against women: an EU-wide survey. Main results. [http://fra.europa.eu/sites/default/files/fra-2014-vaw-survey-main-results\\_en.pdf](http://fra.europa.eu/sites/default/files/fra-2014-vaw-survey-main-results_en.pdf)
3. WHO (2013) Responding to intimate partner violence and sexual violence against women: WHO clinical and policy guidelines. [http://apps.who.int/iris/bitstream/10665/85240/1/9789241548595\\_eng.pdf](http://apps.who.int/iris/bitstream/10665/85240/1/9789241548595_eng.pdf)
4. Dubini V (ed) (2007) *Violenza contro le donne. Compiti e obblighi del ginecologo*. Editeam s.a.s, Cento
5. S.V.S. Soccorso Violenza Sessuale Provincia di Milano (2006) *Linee guida assistenza sanitaria, medico-legale, psico-sociale nelle situazioni di violenza alle donne e ai bambini*. <http://policlinico.mi.it/diCosaHaiBisogno/LineeGuidaSvS.pdf>
6. Genetisti Forensi Italiani (Ge.F.I) *Linee Guida per la repertazione di tracce biologiche per le analisi di genetica forense nel percorso assistenziale delle vittime di violenza sessuale e/o maltrattamento*. <http://www.gefi-isfg.org/temp/2202201374428.pdf>
7. Tozzo P, Caenazzo L, Sagron M, Aprile A (2014) Riferita violenza sessuale e rinvenimento di liquido seminale sulla vittima: analisi medico legale su 123 casi. *Riv Ital Med Leg* 3:825–834
8. Linder J, Zahniser D (1997) The ThinPrep Pap test. A review of clinical studies. *Acta Cytol* 41(1):30–38
9. Pang BCM, Cheung BKK (2007) Identification of human semenogelin in membrane strip test as an alternative method for the detection of semen. *Forensic Sci Int* 169(1):27–31
10. Hochmeister MN, Budowle B, Rudin O, Gehrig C, Borer U, Thali M, Dirnhofner R (1999) Evaluation of prostate-specific antigen (PSA) membrane test assays for the forensic identification of seminal fluid. *J Forensic Sci* 44(5):1057–1060
11. Higuchi R, Fockler C, Dollinger G, Watson R (1993) Kinetic PCR analysis: real-time monitoring of DNA amplification reactions. *Biotechnology (N Y)* 11(9):1026–1030
12. ISTAT (2014) *La violenza contro le donne dentro e fuori la famiglia*. <http://www.istat.it>
13. Lacerenza D, Aneli S, Omedei M, Gino S, Pasino S, Berchiolla P, Robino C (2016) A molecular exploration of human DNA/RNA co-extracted from the palmar surface of the hands and fingers. *Forensic Sci Int Genet* 22:44–53
14. Ratner PA (1993) The incidence of wife abuse and mental health status in abused wives in Edmonton, Alberta. *Canadian Journal of Public Health* 84:246–249
15. Davis JW, Parks SN, Kaups KL, Bennink LD, Bilello JF (2003) Victims of domestic violence on the trauma service: unrecognized and underreported. *J Trauma* 54:352–355
16. Farchi S, Polo A, Asole S, Ruggieri MP, Di Lallo D (2013) Use of emergency department services by women victims of violence in Lazio region, Italy. *BMC Womens Health* 13:31