Original Article

Indian Journal of Forensic Medicine and Pathology
Volume 12 Number 4, October - December 2019
DOI: http://dx.doi.org/10.21088/ijfmp.0974.3383.12419.2

Physical and Laboratory Findings Based Analysis of Sexual Assault Victims

Sindhu S Sahu[1], Manoj K Jena[2]

Abstract

Sexual violence is ubiquitous, a global problem and renders a huge negative impact to mind and health of the population. Our study aims to analyse the genital and bodily injury pattern along with laboratory findings in sexual assault cases. A total of 204 cases of sexual assault were studied in a *two years period* among victims ranging from *3* to *70 years* and mean age *17.8 years* which came to our hospital, in which detailed medico-legal examination findings, history from victim, police record, and laboratory findings were analysed. Majority of victims belonged to *16–17 years* age group (27.45%) and *14–15 years* (22.5%), also with maximum genital injury. Mostly occurred in evening between *4–6 pm* in 40.2% cases and inside the house of victim and in only 22.5% occurred outdoor. In 88.2% cases assailant was known to victim producing genital injury in 14.4% cases. In 11.7% assailant was a stranger in which highest (25%) cases of genital injury was seen and all occurred in outdoor settings. In 96% cases which had single assailant showed 13.2% genital and 20.41% bodily injury but in gang rape (3.93%) 75% cases showed genital and bodily injury. 72.5% females had no prior sexual intercourse among them 78.4% had genital injuries and only 27.4% had experienced prior sexual intercourse among them only 8.9% had recent injury. Kidnapping (23.53%) and verbal threats to kill (20.59%) were used as coercion in most cases. Only 32.5% victims were examined within *72 hours* and among them 42.4% evidenced recent genital injury and 30.3% bodily injury. Sites of genital injury evidenced were labia majora (8 cases), labia minora (10 cases), vagina (2 cases), posterior commisure, fourchette, fossa navicularis (10 cases), hymen-redness (16 cases), recent tear (10 cases). Only 11.3% cases revealed spermatozoa in vaginal smear and 0.1% cases were positive for urine pregnancy test/ultrasonography.

Keywords: Sexual assault; Rape; Medico-legal findings; Genital injury; Victims.

How to cite this article:
Sindhu S Sahu, Manoj K Jena. Physical and Laboratory Findings Based Analysis of Sexual Assault Victims. Indian J Forensic Med Pathol. 2019;12(4):293-300.

Introduction

Sexual violence occurs in every country of the world and in all levels of the society. It has been seen that one in every five women have experienced rape or attempted rape during her lifetime. Sexual violence has become a global problem, not only in the geographical sense but also in terms of age and sex.

Sexual assault, a form of sexual violence, is a term often used synonymously with rape. However, sexual assault could include anything from touching another person's body in a sexual way without the person's consent to forced sexual intercourse.[1] It takes place in various settings like home, school, work place and community. It has a significant negative impact on the physical as well as mental health of the population, like unwanted pregnancy, sexually transmitted infections, HIV/AIDs, adoption of risky sexual behaviours, depression and post-traumatic stress disorder.

Authors Affiliation: [1]Assistant Professor, Department of Forensic Medicine and Toxicology, Fakir Mohan Medical College and Hospital, Balasore, Odisha 756019, India. [2]Professor, Department of Forensic Medicine and Toxicology, SLN Medical College & Hospital, Koraput, Odisha 764020, India.

Corresponding Author: Sindhu S Sahu, Assistant Professor, Department of Forensic Medicine and Toxicology, Fakir Mohan Medical College and Hospital, Balasore, Odisha 756019, India.

E-mail: sahu.sindhu@gmail.com

Received on 12.08.2019, **Accepted on** 23.10.2019.

© Red Flower Publication Pvt. Ltd.

Victims of sexual assault require comprehensive, gender-sensitive health services to cope with the health consequences of these traumatic events. Hence, encouraging the victims for immediate reporting and the crucial role of the medical examiner in identifying the victims, properly collecting evidence, examining the details and providing necessary treatment is of utmost importance to render justice to them, as well as educating the potential mass against these offences that they may face and how to avoid them. Hence, this study was carried out to analyse the various factors and its impact involved in this heinous crime of sexual violence.

Materials and Methods

All the 204 cases of sexual offence which were presented to the department of Forensic Medicine and Toxicology, Government Medical College and Hospital, Balasore, Odisha during the *2 years* study period were considered as study material.

A prospective study was conducted in all the cases, in which data were collected, analysed considering the different factors like age and sex of victim, date, time and place of occurrence, threats given by the assailant, number of assailants involved and acquaintance of victim with them, bodily injuries and genital injuries sustained, time of reporting and time of examination after the incidence from the police requisition papers, hospital records and history from the victim or accompanying persons.

An informed consent for examination and evidence collection was seeked from victim/ guardian if the victim is a minor. A detailed medical and assault history was taken, which also included previous exposure to sexual intercourse, marital status, earlier child birth, abortion which may alter findings of hymen, menstruation history, history of bathed/urinated/defecated/douched, history of STIs, HIV etc, and if any contraceptive method used.

A top to toe examination was conducted, documenting grossly visible external bodily injury sustained, biological materials of forensic importance such as vaginal swab and smears collected from perineum, posterior fornix of vaginal canal, combed and cut pubic hair collected, blood samples for HIV testing, VDRL and HBsAg, urine for pregnancy test collected and sent to pathology laboratory for examination maintaining the chain of custody, also clothing's having suspicious seminal stains were preserved and sent to SFSL. A detailed genital examination was carried out documenting the different type and site of injury, whether recent or old tear or redness present over hymen, the state of hymen whether intact or Carunculae hymenales, injury to labia majora, labia minora, posterior commisure, fourchette, vaginal canal was examined by using hand held magnifying lens and speculum where required and noted, also 1% toluidine blue is sprayed to visualise micro injuries. Two vulva, vagina, anal opening swabs were collected, air dried and two vaginal smear were made on glass slide, air dried in shade, were examined using standard light microscope for the presence of seminal fluid/ spermatozoa. The observations were tabulated, figures drawn and statistically analysed using chi-square, *p*-value, and results discussed with other authors.

Results

A total of 204 cases of sexual assault were taken for study, all the victims were females, the age of the victim ranges from 3 to 70 years and the mean age is found to be 17.87 years, 79.41% of cases were between *0* and *19 years*. Maximum cases were seen in age group *16* to *17 years i.e.*, 56 (27.45%) cases followed by *14* to *15 year* age group *i.e.,* 46 (22.55%) cases. Also maximum genital injuries 88(43.1%)

Table 1: Distribution of cases according to Age of Victim

Victims Age Group	Number of Cases	Percentages (%)	Genital Injuries		
			Recent	Old	Absent
<10	14	6.86	8	2	4
10–11	4	1.96	0	2	2
12–13	24	11.76	4	10	10
14–15	46	22.55	8	32	6
16-17	56	27.45	4	44	8
18–19	18	8.83	2	14	2
>20	42	20.59	6	36	0
Total	204	100	32	140	32

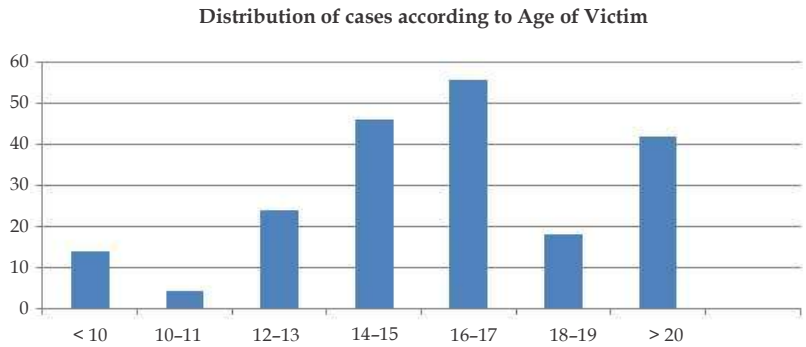

Fig. 1: Distribution of cases according to Age of Victim

cases were present in this age group (14 to 17 years),(Table1)(Fig. 1), regarding time of occurrence of the incidence, maximum cases were found between *4* and *6 pm* and between *7* and *9 pm i.e.,* 82 (40.2%) and 48 (23.57%) cases respectively and least cases *i.e.,* 2 (0.9%) after midnight. In (**Table 3**), taking place of occurrence into account, about 82 (40.2%) cases occurred inside house of victim and 76 (37.25%) cases in accused houses which included school premises, neighbors, relatives, kidnapping cases, friend's house. Rest 46 (22.55%) cases occurred outdoor places like construction areas, ponds, jungle, field, isolated areas. In 180 (88.24%) cases the assailant was known to the victim and in only 24 (11.76%) cases the accused was unknown person. When the accused was unknown the incidence mostly occurred outside (*i.e.,* 18 (75%) cases). Among known accused cases maximum (78 (43.33%)) occurred inside the victims house by close relatives, blood relatives, neighbor, boyfriends. In only 32 (15.69%) cases recent genital injuries were detected. Highest percentage of recent genital injuries (*i.e.,* 6 cases (25%)) was witnessed among unknown accused cases and few cases with

Table 2: Time of occurance of Assault

Time of Occurance	No of Cases	Percentages (%)
7AM–9AM	10	4.9
10AM–12PM	22	10.78
1PM–3PM	26	12.75
4PM–6PM	82	40.2
7PM–9PM	48	23.57
10PM–12AM	14	6.9
1AM–3AM	2	0.9
4AM–6AM	0	0
Total	204	100

Table 3: Place of occurance of Sexual Assault and their acquintance with the accused.

Place of Occurance	Number of Cases	Percentages (%)	Acquintance with accused			
			Yes	%	No	%
Inside house of victim	82	40.2	78	95.1	4	4.9
Inside house of accused	76	37.25	74	97.37	2	2.63
Outside	46	22.55	28	60.87	18	39.12
Total	204	100	180	88.24	24	11.76

p value ≤ 0.05 (under number of cases), *p* value <0.01 (under acquaintance with accused)

Table 4: Acquintance with assailant and Genital Injuries

Acquintance with assailant	Number of cases	Percentages (%)	Genital Injuries	
			No of cases	%
Known	180	88.24	26	14.44
Unknown	24	11.76	6	25
Total	204	100	32	15.69

p value ≤0.05 (under number of cases), *p* value <0.01 (under genital injuries)

known accused revealed genital injuries *i.e.*, 26 cases (14.44%), (**Table 4**).

In (**Table 5**), 196 (96.07%) cases there was single assailant involved and in 8 (3.93%) cases more than one assailant was involved. 75% of cases revealed recent genital injury when more than one assailant is involved also 75% cases evidenced bodily injury.

Table 5: Involvement of one or more assailant in each case and Associated Genital, Bodily Injury

Number of assailants	Number of cases	Percentages (%)	Genital Injuries		Bodily Injuries	
			No of cases	%	No of cases	%
1	196	96.07	26	13.27	40	20.41
> 1	8	3.93	6	75	6	75
Total	204	100	32	15.69	46	22.55

p-value > 0.05 *p*-value < 0.01 *p*-value > 0.05

A total of 46 (22.5%) cases showed bodily injury, and in cases where single assailant is involved only 20.41% cases reported bodily injury.

In 148 (72.55%) cases females had no experience of prior sexual intercourse, among them 116 (78.4%) had genital injuries out of which 26 (22.41%) cases had recent injury and 90 cases had old injury.

Table 6: Genital Injury following Sexual Assault with or without prior Sexual Intercourse Experience

Prior Sexual Intercourse	Number of Cases	Genital Injury		
		Recent	Old	Absent
Without	148 (72.5%)	26	90	32
With	56 (27.5%)	6	50	0
TotaL	204 (100%)	32	140	32

56 (27.4%) cases had experienced prior sexual intercourse out of which 5 (8.9%) cases had recent injury and 50 cases had old injury, (**Table 6**).

Among the different circumstances and threats under which rape was committed, there were 48 (23.53%) cases of kidnap, 42 (20.59%) cases of verbal threats to kill, 18 (8.8%) cases of false promise to marry, 10 (4.90%) cases of physical threats to kill (throttling, smothering, weapon) and 4 (1.96%) cases of sedation were used as coercion, (**Table 7**).

Table 7: Different Circumstances and threats under which RAPE was committted

Circumstances	Number of Cases	Percentages (%)
Verbal threat to kill	42	20.59
Kidnap	48	23.53
False promise to marry	18	8.82
Physical threat to kill	10	4.90
Sedation	4	1.96
No threat	60	29.4
Consensual	22	10.8
Total	204	100

In (**Table 8**), only 66 (32.35%) cases victims came for examination within *72 hours* of the incidence and rest 138 (67.65%) cases came after *72 hours*. Recent genital injury were mostly found in cases where the victim turned out for examination within *72 hours, i.e.,* 28 (42.42%) cases out of which 18 cases were within *24 hours*, 4 cases in between *24* and *48 hours* and 6 cases in between *48* to *72 hours*, no genital injury was present in 10 (15.15%) cases and old injury or previously experienced sexual intercourse in 28 (42.42%) cases. Similarly bodily injuries were present in 20 (30.30%) cases among those who came within *72 hours*. After *72*

Table 8: Time of examination of victims and Genital and Bodily Injury findings

Time of examination of Assault Case	No of Cases	Genital Injuries			Bodily Injury	
		Present		Absent		
		Recent	Old		Present	Absent
< *24 HRS*	34	18	8	8	14	20
24–48 HRS	10	4	4	2	2	8
48– 72 HRS	22	6	16	0	4	18
> *72 HRS*	138	4	112	22	26	112
Total	204	32	140	32	46	158

p-value > 0.05

hours lapse only 4 (2.9%) cases revealed recent genital injury, no injury in 22 (15.94%) cases and old injury in 112 (81.2%) cases. Similarly bodily injury among these cases were found in only 26 (18.84%) cases.

In (**Fig. 2**), among the different sites of genital areas injured, Labia Majora (abrasion, contusion, laceration) in 8 cases, Labia Minora in 10 cases, vagina (laceration) in 2 cases, Posterior Commisure,

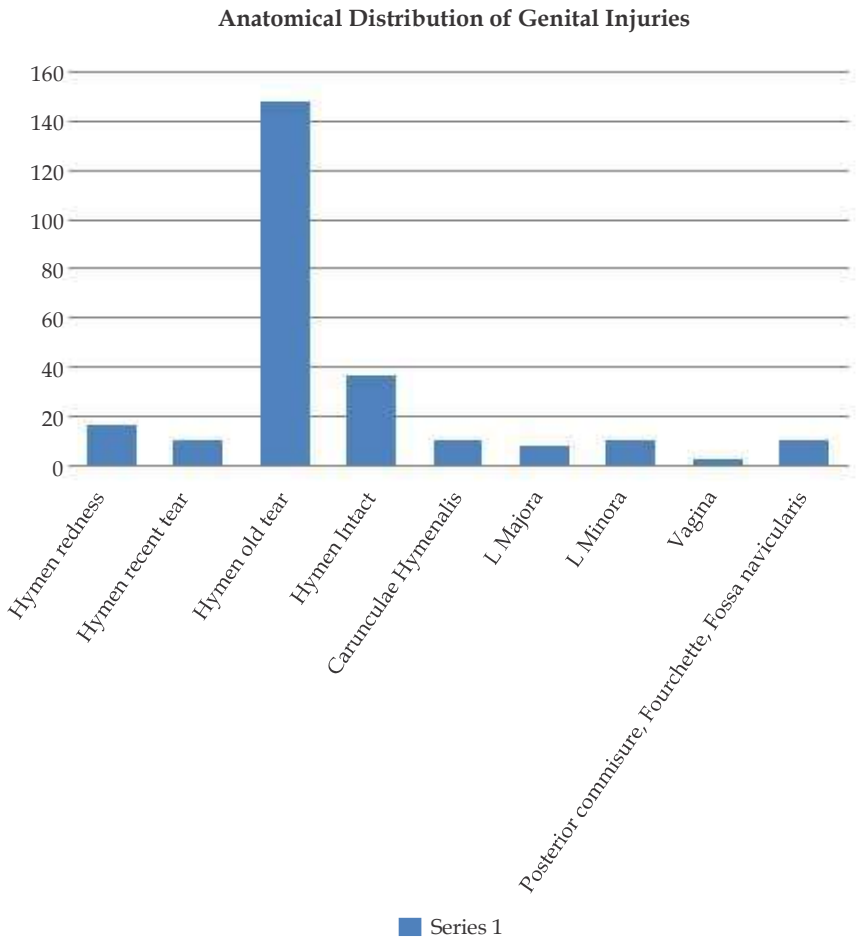

Fig. 2: Anatomical Distribution of Genital Injuries

Fourchette, Fossa Navicularis (tear, redness, contusion) in 10 cases. Hymen shows redness in 16 cases, recent tears in 10 cases, old tear in 148 cases, Carunculae hymenales in 10 cases, intact hymen in 36 cases.

In (**Table 9**), only 22 cases the laboratory report findings showed positive correlation with rape cases, spermatozoa were seen in vaginal smear under microscope in 23 cases and 18 cases were positive for urine pregnancy test or ultrasonography

Table 9: Laboratory report findings

Laboratory findings	No of Cases
Spermatozoa present	23
UPT positive/ USG Finding	18
HIV positive	0
VDRL reactive	0
Total	43

Table 10: Presence of spermatozoa taking in account time of collection of Vaginal Swab

Time of Vaginal Swab sample collection from incidence	No of Cases	Spermatozoa present Cases
< *24 hrs*	**34**	**19**
24–48 hrs	**10**	**3**
48–72 hrs	**22**	**1**
> *72 hrs*	**138**	**0**
Total	**204**	**23**

of pelvis. Among the 23 cases which showed spermatozoa 19 cases were positive within *24 hours*, 3 cases in between *24* and *48 hours*, 1 case in between *48* and *72 hours* and no spermatozoa found after *72 hours* of incidence, (**Table 10**).

Discussion

A total of 204 cases of sexual assault were evaluated, all the victims were females, the age of the victim ranges from *3* to *70 years* with a mean age of *17.87 years*, 79.41% of cases were between *0* and *19 years*, the findings of the present studies were similar to studies of Santos JC *et al*. with 352 victims between *93 days* and *86 years* and a mean age of *17.5 years* and 61% in age from 0–19 years, Riggs N studied 1076 cases with 96% female victims aging *1–85 years* and mean of *25 years*, Avegno J studied 1172 cases in which 92.6% were women and mean age *27 years*, Grossin C studied 418 cases with 86% females and mean age 22.4 years.[4–7]

Maximum cases were in age group *16* to *17 years i.e.*, 56 (27.45%) cases followed by *14* to *15 year* of age group *i.e.*, 46 (22.55%) cases. Also maximum genital injuries 88 (43.1%) cases were present in this age group (*14* to *17 years*).

Regarding time of occurrence of the incidence, maximum cases were found between *4* and *6 pm* and between *7* and *9 pm i.e.*, 82 (40.2%) and 48 (23.57%) cases respectively and least cases *i.e.*, 2 (0.9%) after midnight.

Taking place of occurrence into account, about 82 (40.2%) of cases occurred inside house of victim and 76 (37.25%) cases in accused houses which included school premises, neighbors, relatives, kidnapping cases, friend's house, because there is least doubt on these perpetrators of rape who are trustworthy people and also they can easily approach and gain confidence of the innocent children. Almost same finding were obtained by Grossin C who found victims house was the most frequent place of sexual assault in 35% cases, also Stermac LE found sexual assault was more likely to occur in home of victim (chi 2 = 36.27, 1 df, $p < 0.001$).[2,6] Rest 46(22.55%) cases occurred at outdoor places like; construction areas, ponds, jungle, field, vehicle, isolated areas.

In 180 (88.24%) cases the assailants were known to the victim and in only 24 (11.76%) cases accuses were unknown person. At par with the results revealed by Santos JC, where a large majority belonged to the victims social and family circle (85%), Avegno J found 53% knew their assailants and 11.76% unknown person, Riggs N found the assailant was a stranger in 39% cases.[4,5,7.] When the accuses were unknown the incidence mostly occurred outside (*i.e.*, 18 (75%) cases), also found by Stermac LE that sexual assault by a stranger was more likely to occur outdoors or in a vehicle.[2] Among known accused cases maximum (78 (43.33%)) occurred inside the victims house by close relatives, blood relatives, neighbor, boyfriends. A total of only 32 (15.69%) cases had recent genital injuries, which was also observed by Sugar NF in 20% of victims, Santos JC in 31% of cases had traumatic genitalia and/or the anus, Riggs N observed 53% cases of genital trauma.[4,5,8] Highest percentage of recent genital injuries (*i.e.*, 6 cases (25%)) was witnessed among unknown accused cases and few cases with known accused revealed genital injuries *i.e.*, 26 cases (14.44%). Stermac LE also found the mean number of trauma sites was greater among victims assaulted by strangers than among those assaulted

by people they knew ($t = -4.29$, 180df, $p \leq 0.001$).[2]

In 196 (96.07%) cases there was single assailant involved and in 8 (3.93%) cases more than one assailant was involved. Authors like Riggs M, Avegno J found multiple assailants were uncommon *i.e.*, 20% and 18.1% respectively.[5,7.] Three-forth (75%) of cases revealed recent genital injury when more than one assailant is involved. A total of 46 (22.5%) cases showed general bodily injury, which was also found by Santos JC (28%), Grossin C (29%), Avegno (51.7%) and Riggs N (67%).[4–7] In cases where single assailant is involved only 20.41% cases reported bodily injury and 75% cases evidenced bodily injury when multiple assailant were involved.

In 148 (72.55%) cases females had no experience of prior sexual intercourse, among them 116 (78.4%) had genital injuries out of which 26 (22.41%) cases had recent injury and 90 cases had old injury, old injury are due to delay in reporting and examination. 56 (27.4%) cases had experienced prior sexual intercourse out of which 5 (8.9%) had recent injury and 50 had old injury. Similar to the study of Biggs M in 132 women, where 50% (66) had no prior sexual intercourse and significantly more women without than with prior sexual intercourse experience had visible genital injuries (65.2% *v* 25.8%, $p < 0.001$) and 9.1% had hymenal perforation in women without prior sexual intercourse.[3]

Among the different circumstances and threats under which rape was committed, there were 48 (23.53%) cases of kidnap, 42 (20.59%) cases of verbal threats to kill, 18 (8.8%) cases of false promise to marry, 10 (4.90%) cases physical threats to kill (throttling, smothering, weapon) and 4 (1.96%) cases of sedation were used as coercion. Similar findings were obtained by Riggs N that force was used in 80% cases and in 27% of cases a weapon was present, Avegno J found threats of force were common in 72.4% sample.[5,7]

In only 66 (32.35%) cases victims came for examination within *72 hours* of the incidence and rest 138 (67.65%) cases came after *72 hours*. Recent genital injury were mostly found in cases where the victim turned out for examination within *72 hours*, *i.e.*, 28 (42.42%) cases, no genital injury was present in 10 (15.15%) cases and old injury or previously experienced sexual intercourse in 28 (42.42%) cases. Similarly bodily injuries were present in 20 (30.30%) cases among those who came within *72 hours*. After *72 hours* lapse only 4 (2.9%) cases revealed recent genital injury, no genital injury in 22 (15.94%) cases and old injury in 112 (81.2%) cases. Similarly bodily injuries among these cases were found in only 26 (18.84%) cases. Similar study done by Grossin C found genital trauma occurred in 35.7% of the cases in first group (within *72 hours*) and in 19.5% cases in second group (after *72 hours*), general body trauma was found in 39.1% of cases in first group and 6.3% cases in second group.[6]

Among the different anatomical sites of genital injury, Labia Majora (abrasion, contusion, laceration) in 8 cases, Labia Minora in 10 cases, vagina (laceration) in 2 cases, Posterior Commisure, Fourchette, Fossa Navicularis (tear, redness, contusion) in 10 cases. Hymen shows redness in 16 cases, recent tears in 10 cases, old tear in 148 cases, Carunculae hymenales in 10 cases, intact hymen in 36 cases. Hymen injury was seen in 11.3% cases, which was also documented by Grossin C found hymenal, vulvo vaginal and anal lesions were 11%, 20% and 7% respectively.[6]

In only 22 cases the laboratory report findings reflected positive correlation with rape, where spermatozoa were seen in vaginal smear under microscope in 23 (11.3%) cases and 18 cases were positive for urine pregnancy test or ultrasonography of pelvis. Similar findings were obtained by Riggs N, Santos JC and Grossin C *i.e.*, 13%, 34%, 30.3% respectively.[4–6.]

Conclusion

The new laws/amendments have been made pertaining sexual assault and rape. It is a fact and the perception of the society and the court, doctors as a medico legal expert will ventilate the exact scientific knowledge basing on his findings to render justice. At the same thus, it is the duty of the doctors to escalate their skills at par with the changing scenario of the medico-legal examinations in order to not only to protect ourselves from legal complications but also to help the victim from these crimes.

The sexual assault examiner is a specially trained professional needed care, documentation of the details of the assault and to collect evidence timely is a paramount importance. At the same time, the doctors involved in dealing of such cases also required to recommend the physical as well as mental examination of the victim if needed.

The guidelines for the health workers must be prepared with a aim for providing an appropriate understanding of sexual violence and the needs and the rights of survivors/victims of sexual violence, more importantly to highlight the medical and the forensic responsibilities of health professionals.

References

1. Guidelines & Protocols: Medico-legal care for survivors/victims of sexual violence. Ministry of Health & Family Welfare Government of India. 2013.pp.3–30.
2. Stermac LE, Du Mont JA, Kalemba V. Comparision of sexual assaults by strangers and known assailants in an urban population of women. CMAJ. 1995 Oct 15;153(8):1089–094.
3. Biggs M, Stermac LE and Divinsky M. Genital injuries following sexual assault of women with and without prior sexual intercourse experience. Canadian Medical Association Journal. 1998;159(1):33–37.
4. Santos JC, Neves A, Rodrigues M, Ferrao P. Victims of sexual offences: medicolegal examination in emergency settings. J of Clin Forensic Med. 2006;13(6–8):300-3.
5. Riggs N. Analysis of 1,076 cases of sexual assault. Ann Emerg Med. 2000 Apr;35(4):358–62.
6. Grossin C, Sibille I, Grandmaison GL, *et al*. Analysis of 418 cases of sexual assault. Forensic Sci Int. 2003 Jan 28;131(2-3):125–30.
7. Avegno J, Mills TJ, Mills LD. Sexual assault victims in the emergency department: Analysis by demographic and event characteristics. J Emerg Med. 2009 Oct;37(3):328–34.
8. Sugar NF, Fine DN and Eckert LO. Physical injury after sexual assault: Findings of a large case series. Am J Obstet Gynecol. 2004 Jan;190(1):71–6.