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Article

Patterns of Hymenal Tears in Sexual Assault Victims at a National Referral Hospital in Indonesia: A Cross-Sectional Study

Rika Susanti [1], *Deona Ramadhani* [2]

[1]*Department of Forensic and Medicolegal, Faculty of Medicine, Universitas Andalas, Padang, Indonesia*

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CORRESPONDENCE

Phone: +62 813-7259-3763
E-mail: rikasusanti@med.unand.ac.id

A B S T R A C T

Evidence of sexual intercourse in long-past sexual assault cases based solely on hymenal tears. In long-standing cases of sexual assault, hymenal tears were often the only available evidence to prove sexual intercourse. This study aims to explore the characteristics of sexual assault victims and the patterns of hymenal injuries. This a descriptive research design with a cross-sectional study was conducted at Dr. M. Djamil General Central Hospital, Padang, Indonesia. A total of 60 medical records were consecutively selected based on inclusion criteria of samples. The researcher obtained permission to conduct the study, once approval was received from the hospital management, medical records of sexual assault victims from the Department of Forensic Medicine and Medicolegal at Dr. M. Djamil General Central Hospital, Padang, Indonesia were collected. The majority of the sample consisted of adolescents aged 13–18 years (55%), with most being students (59%). In terms of educational background, the largest group had completed elementary school (37%), followed by junior high school graduates (23%). Signs of external violence outside the genital area were absent in 82% of cases. A history of prior intercourse was reported by 50% of the sample, with 40% having experienced it more than once. Forced intercourse was reported in 38% of cases. The most common hymenal tears were at the 3 o'clock and 9 o'clock positions, with 59% of tears not reaching the base, and 84% classified as old tears. The majority of sexual violence victims were school-aged children, with incidents involving forced intercourse. Most victims had a prior history of sexual activity. The most frequent hymenal tears were classified as old tears, predominantly located in the lower posterior region, between the 3 o'clock and 9 o'clock positions.

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I. INTRODUCTION

Evidence of sexual intercourse in long-past sexual assault cases based solely on hymenal tears. In long-standing cases of sexual assault, hymenal tears were often the only available evidence to prove sexual intercourse. Law enforcement relied on hymenal tears as a key indicator in these cases, as outlined in Visum et Repertum (medical-legal reports). However, interpretations of hymenal tears, particularly regarding their direction and location, varied among officials. [1,2]

The hymen is a thin membrane that encircles the vaginal opening. Tears in the hymen are not always caused by sexual intercourse, and intercourse does not always result in hymenal tears. In prepubescent girls, the hymen is less elastic, and the vaginal opening is smaller than in adults. A study that examined the hymens of adolescent girls with and without a history of sexual intercourse found that 52% of those with a history of sexual intercourse did not exhibit hymenal tears. [3–7]

The direction and location of hymenal tears resulting from intercourse could vary due to several factors, including penis size, hymenal elasticity, vaginal size, and the area of greatest pressure during penetration. Generally, tears occurred in the posterior part of the hymen, but they could not definitively distinguish between consensual and forced intercourse. Tears at the 5 o'clock and 7 o'clock positions were often interpreted as signs of forced intercourse, while tears at other positions were typically associated with consensual intercourse. [8,9, 10]

Previous study found on genital injuries in female rape victims, the most frequent hymenal tears were found at the 6 o'clock position (11.6%), followed by the 3 o'clock position (11.2%), with only a slight difference between the two. [11] Conversely, another study that examined genital injuries based on non-marital sexual positions found that 32% of hymenal tears occurred at positions other than the 5 o'clock and 7 o'clock locations. [12]

To date, no research has specifically focused on the direction of hymenal tears in victims of sexual assault involving confirmed intercourse. The objective of this study is to explore the characteristics of sexual assault victims and the patterns of hymenal injuries observed at a national referral hospital in Indonesia.

II. METHODS

Study Design and Setting

This study employed a descriptive research design with a cross-sectional approach, focusing on the independent variable (hymenal tears) at a specific point in time. The study was conducted at the Department of Forensic Medicine and Medicolegal, Dr. M. Djamil General Hospital, Padang, Indonesia.

Study sample

The participants in this study were sexual assault victims who underwent examinations at the Department of Forensic Medicine and Medicolegal, Dr. M. Djamil General Central Hospital, Padang, and had complete medical records. The sample size was calculated using infinite sample size with the confidence interval was 95%, the proportion of hymenal tears in sexual assault victims among subjects was 19% (0.11)10 and the precision 10% formula as follows:

$$n = \frac{Za^2 x p x q}{d^2}$$

$$n = \frac{1.96^2 x 0.19 x 0.81}{0.1^2} = 60$$

Thus, the minimum required sample size was calculated to be 60 subjects. The sampling method employed was non-probability sampling, specifically consecutive sampling.

Measures

The variables in this study included sexual intercourse, age, occupation, education level, extra-genital injuries, prior sexual history, direction of hymenal tears, depth of hymenal tears, and categorization of hymenal tears. Sexual intercourse was defined as penile penetration into the vaginal canal, categorized as either consensual or non-consensual.[13]Age was divided into several categories, ranging from 0 to over 60 years.[14] Occupation was categorized into students, university students, employed, and unemployed. Education level was classified based on the highest academic qualification completed.[15] Extra-genital injuries were categorized as present or absent, based on whether signs of violence were found on other parts of the body.[13] Prior sexual history was classified into never, once, or more than once.[16] Hymenal tears were categorized as new or old, full or partial depth, and by location. The number of hymenal tears may exceed the total number of samples, as more than one tear can be found in a single sample.[17,18] New or old tears were differentiated by the presence or absence of inflammatory signs on the edges of the tear. Full or partial depth tears were categorized based on whether the tear extended to the lower edge of the labia minora. The location of the hymenal tear was classified based on the clock-face method.

Data collection

The researcher obtained approval to conduct the study. After receiving authorization from the hospital management, medical records of sexual assault victims from the Department of Forensic Medicine and Medicolegal at Dr. M. Djamil General Central Hospital in Padang, Indonesia, were collected. To maintain confidentiality, the researcher recorded the relevant data while excluding the victims' names. The data, which covered the study variables, was then organized into a data table for analysis.

Ethical approval

This study was approved by the Research Ethics Committee of Dr. M. Djamil General Central Hospital.

Data analysis

Univariate analysis was performed to create frequency distributions for each variable, including whether the intercourse was consensual or non-consensual, age, occupation, education level, presence of extra-genital injuries, prior sexual history, and descriptions of the hymenal tears. Data analysis was performed by SPSS.

III. RESULT

A total of 60 medical records that met the study criteria were included, and all eligible records were used as research samples. The characteristics of the sample are presented in Table 1.

Table 1: Characteristics of the study samples (n=60)

Variables	f (%)
Age	
Child (0-12)	20(33)
Adolescence (13-18 years)	33(55)
Adult (19-59 years)	7(12)
Senior Adult (60 years and above)	0(0)
Occupation	
Student	35(59)
University Student	6(10)
Employed	5(8)
Unemployed	14(23)
Education Level	

Not yet in school	13(22)
Elementary school	22(37)
Junior High School	14(23)
Senior High School	9(15)
University	2(3)

According to Table 1, the majority of the sample were adolescents aged 13–18 years (55%). There were no participants over the age of 60. Most of the sample were students (59%). Regarding educational background, the largest group had completed elementary school (37%), followed by those who had finished junior high school (23%).

The characteristics of events related to intercourse are shown in Table 2.

Table 2: Events related to sexual intercourse (n=60)

Variables	f (%)
Other Violence	
Present	11(18)
Absent	49(82)
History of sexual intercourse	
More than one	24(40)
One	6(10)
Unknow	30(50)
Type of sexual intercourse	
Forced	23(38)
Non forced	14(24)
Unknow	23(38)

Table 2 indicates that signs of external violence outside the genital area were absent in most cases (82%). A history of prior intercourse was reported by 50% of the sample, with 40% having experienced intercourse more than once and 10% having experienced it only once. Forced intercourse was reported in 38% of cases.

Table 3 provides a description of hymenal tears.

Table 3: Description of hymenal tears (n=135)

Variables	f (%)
Location of the tears	
1 o'clock position	6(4)
2 o'clock position	3(2)
3 o'clock position	31(23)
4 o'clock position	3(2)
5 o'clock position	13(10)
6 o'clock position	16(12)
7 o'clock position	17(13)
8 o'clock position	8(6)
9 o'clock position	23(17)
10 o'clock position	1(1)
11 o'clock position	12(9)
12 o'clock position	2(1)
Depth of tears	

To the base	56(41)
Not to the base	79(59)
Time of tears	
Old tear	114(84)
New tear	21(16)

Based on Table 3, the most frequent direction of hymenal tears was at the 3 o'clock position (23%), followed by the 9 o'clock position (17%). The majority of tears did not reach the base (59%). Additionally, most hymenal tears were categorized as old tears (84%).

IV. DISCUSSION

The age distribution of the sample aligned with previous study on the profile of sexual violence cases, which found that the majority of victims were minors under the age of 17 (85%).[19] Similarly, Hidayat et al. reported that 76.4% of sexual violence victims were below 18 years old.[20] Howard's research in the United States also found the highest incidence of sexual violence in the 12–17 age group.[21] Children and adolescents were particularly vulnerable to sexual violence due to their physical weakness, dependence on adults, and factors such as their living environment and family socioeconomic status.[22] However, contrasting data from the U.S. showed that the majority of sexual violence victims were aged 18–34 years. [23] This could have been attributed to the fact that U.S. data included both male and female victims, and may have also been influenced by cultural factors such as higher rates of casual relationships among adolescents and the effects of alcohol consumption.[24,25]

The sample's occupational and educational characteristics aligned with previous studies 20, 26. Hidayat et al. found that 61.4% of sexual harassment victims were students, with the highest education level being primary school (22.9%).[20] Similarly, a study conducted in Ethiopia reported that 61% of rape cases in Kule Refugee Camp involved students in grades 7 and 8. [26] Other studies found higher rates of sexual violence among university students, which may have been related to increased social freedom, the desire for identity assertion, and alcohol consumption. [24,25,27]

Several previous studies reported that most victims of sexual violence did not present with external genital injuries. [20,28] Factors contributing to this included non-physical threats from perpetrators, psychological manipulation, incapacitation due to drugs or alcohol, or delayed examinations, which allowed injuries to heal. [27, 29] Previous studies also indicated that many victims of sexual violence had engaged in sexual intercourse prior to the assault. [20, 30, 31,32,33] This suggested that sexual activity among adolescents was becoming increasingly common, potentially due to open access to information, exposure to pornography, and unsupervised social activities. Most sexual violence victims in this study experienced forced intercourse, which aligned with previous findings showing a high prevalence of forced sexual acts. [20,34,35]

The positions of hymenal tears in this study was consistent with previous research. Previous study found that most hymenal tears in women outside of marital intercourse occurred in positions other than 5 o'clock and 7 o'clock12. In contrast, typical intercourse often resulted in tears at the 5 o'clock and 7 o'clock positions. [36] In a case study by Kim et al., hymenal tears were found at the 3 o'clock, 6 o'clock, and 9 o'clock positions.[2] This likely resulted from the posterior pressure on the hymen and posterior fourchette during face-to-face intercourse.

The majority of hymenal tears in this study did not extend to the base, consistent with findings by Beyer et al. and Hidayat et al., who reported that incomplete hymenal tears were common in child sexual abuse cases. [20,37] Factors influencing the depth of hymenal tears included spontaneous blunt object penetration, the type of hymen, and its elasticity. [38] In this study, most hymenal tears were

classified as old, which was consistent with previous research findings.[2, 19, 20] This likely resulted from the fact that most victims sought medical care long after the sexual violence occurred.
Limitations of this study arise from its descriptive nature and cross-sectional design, which only provides a snapshot of the data and does not facilitate the establishment of relationships between variables. To investigate these relationships, future studies should utilize analytical methods. Moreover, further research is recommended to explore the direction of hymenal tears in relation to sexual positions, as this could clarify whether the direction of tears is influenced by the position during intercourse.

V. CONCLUSION

Most of the sexual violence victims were school-aged children, with the majority of cases involving forced intercourse. Many victims had previously engaged in sexual activity. The most frequent hymenal tears were older injuries, primarily found in the lower posterior area, between the 3 o'clock and 9 o'clock positions.

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BIOGRAPHY

Dr. dr. Rika Susanti, Sp.FM (K) is a lecturer in the Department of Forensic Medicine, Faculty of Medicine, Andalas University. She specializes in forensic and medicolegal sciences and has completed her medical degree, specialist training (Sp.FM), and consultant qualification (K) in forensic medicine. She is actively involved in teaching, research, and forensic services, with interests in forensic pathology and medicolegal analysis. She also contributes to academic development within the department.