

ORIGINAL ARTICLE

Medicine Science 2021;10(2):317-20

Should enterobiasis be considered during the examination of sexually abused children?** Serbulent Kilic¹,  Muharrem Bostanci²**¹Bursa Yuksek Ihtisas Training and Research Hospital, University of Health Sciences, Department of Forensic Medicine, Bursa, Turkey²Bursa Yuksek Ihtisas Training and Research Hospital, University of Health Sciences, Department of Pediatrics, Bursa, Turkey

Received 21 September 2020; Accepted 16 November 2020

Available online 09.02.2021 with doi: 10.5455/medscience.2020.09.194

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**Abstract**

The medical rape examination has some difficulties and sometimes genital findings can be confusing for the examiner. In this study, the sexually abused children with anal rape were focused on. Perianal reddening due to itching is important. It is known that one of the parasitic diseases that cause anal pruritus is enterobiasis. A person infected with *Enterobius vermicularis* can occasionally scratch his/her perianal region and make a reddening in the anal region mimicking sexual abuse. The present study aimed to determine the rate of reddening in the anal region due to enterobiasis. 24 sexually abused children and 24 healthy participants were recruited in this study to determine the seen ratio of enterobiasis in sexually abused children by using the transparent tape method. Three of 24 sexually abused children were found infected. No infection was seen in any control group member. The seen ratio of enterobiasis was not significantly associated with sexual abuse history ($P=0.234$). No difference was not seen in the two groups in terms of enterobiasis. The rate of enterobiasis in sexually abused children was 12.5% in the current trial, a finding that should encourage the practitioners to consider the possibility of enterobiasis infection during the examination of the genitalia.

Keywords: Forensic medicine, anal pruritus, *Enterobius vermicularis*, injury, sexually abused children, trauma.**Introduction**

The term sexual assault is referring to sexual behaviors without the agreement of the survivor [1]. Sexual abuse is a crime that affects not only the victim but also the public. When the victim is a child, it would be more harmful due to the minor's vulnerable physical and mental conditions. Diagnose and treatment of Sexually Abused Children (SAC) needs a multidisciplinary approach. It has ethical, public health, medico-legal, policy, and social aspects [2]. However SAC is not rare, it is thought that almost 90% of victims are not revealed [3]. World Health Organization reported that one in five women and one in thirteen men have a history of sexual abuse during the childhood period [4]. In Turkey, 142.179 children applied to the security centers suffering from sexual crimes in 2015 [5].

Sexual crimes are regulated by the Turkish Penal Code, numbers 103 and 104, and evaluated under the topics of 'sexual abuse of children' and 'sexual intercourse with a minor' [6].

Sexual assault can be vaginal, oral, and anal contact, touching and exhibitionism, etc. Child Protective Service (CPS) has been set up in recent years all around the country in terms of examination and treatment of SAC cases. Forensic medicine specialists and pediatricians prepare the expert report to help justice, in light of physical and genital examination. Diagnosis of sexual assault is based on medical examination and collecting evidence from the victim's body. The examination of genitalia has some difficulties in discrimination of trauma. A study including almost 2000 sexual assault cases reported that DNA samples were obtained from only 1,4% of all cases [1]. This finding shows that visual inspection of rape examination still has a major role in the diagnosis.

Findings of bodily injury can not be determined easily if an examination is performed with a child at the age of less than eighteen [7]. The most affected age groups of SAC cases were 10 to 13 years old and 5 to 9 years old [3].

Enterobiasis is a disease that causes institutional and household epidemics mostly in children [8]. *Enterobius vermicularis* is a parasite has a whitish color, almost 0,5-1 cm long and matures in the large intestine of human [9]. Enterobiasis is one of the parasitic diseases seen frequently worldwide. It is estimated that

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at least 200 million people are contaminated [9]. The infection is seen commonly in school-aged children and usually asymptomatic [10]. Enterobiasis is a disease spread by a worm [10]. The most common symptom of the infection is anal pruritus [10]. Other enterobiasis symptoms are loss of appetite, abdominal pain, pallor, and irritability [9]. At night, the worm arrives in the anal region and lays eggs in the perianal region, and the eggs can be alive in indoor conditions for almost 3 weeks [10].

In this study, we focused on the anorectal injury of SAC cases. A study that contains twelve people who had rectal injury reported that two of them were caused by sexual assault [11]. Reddening of the anus sometimes can be confusing for the examiner. A study that contains twelve people who had rectal injury reported that two of them were caused by sexual assault [11]. The distinction of etiology of anus reddening helps us to discriminate between trauma and infection. It can be a sign of not only sexual assault finding but also due to anal scratching.

Sexual assaults on children are subject threats to public policy. This study aimed to investigate the role of enterobiasis, as a parasitic disease, whether to cause reddening of the anus or not. We evaluate statistically reddening of the anus in which proportion. Reddening of the anus, as an anal assault finding, differ between children with sexual trauma and without. The aim of the study also is to increase the awareness of SAC.

Materials and Methods

Using a descriptive design, the study was conducted between April 15th, 2016, and April 15th, 2017. The data collection was performed in the department of CPS and the clinic of pediatrics in XXX Training and Research Hospital. The participants were divided into two groups as SAC and healthy children. Each group consisted of 24 participants. Neither age, nor race, nor height, nor weight differed between the groups. The Group of SAC cases were the participants who applied our CPS. Members of the control group were recruited from the clinic of general pediatrics. The participants' transparent tape samples were obtained when they apply to our CPS. Both groups consist of participants under 18 years old. Inclusion criteria were age (under eighteen), getting examined within 72 hours following a sexual abuse with anal contact. Exclusionary criteria were for both groups were chronic diseases including any metabolic or inflammatory diseases, usage of drugs, an autoimmune disease, neuro-muscular disease. Some of the participants agitated were refused from the study. Approvals were obtained from the children and their parents for the study after reading the informed consent form and oral presentation.

A genital examination consists of bi-manual retraction of genitalia and direct visual inspection that is used for evaluating whether an anal abuse existence or not. The anal examination was performed in the left lateral position. The gluteal separation was performed for a half minute to wait if anal dilatation happens. If present some findings such as laceration, abrasion, reddening, ecchymosis, anal fissure, soiled anus were recorded. A Reflex anal dilatation test was also performed. Neither any tool nor camera was used during the examination.

After the examination, SAC cases were determined by the transparent tape method which is to touch anal skin with

transparent tape to collect *Enterobius vermicularis* eggs exist the perianal region. If the disease presents, the eggs on the tape would be visible by a microscope [10].

Approval was obtained from the ethics committee of the University of Health Sciences for the study. Approvals were obtained from the children and their parents for the study after reading the informed consent form and oral presentation. The results were analyzed statistically.

IBM SPSS Statistics Version 20 program (SPSS Inc.; Chicago, IL, USA) was used for the statistical analysis. Data were analyzed Chi-Square Tests for dichotomous variables. A p-value of <0.05 was considered statistically significant. Fisher's Exact Test was permitted due to 2 cells (50,0%) have expected countless than 5. The value of $P=0.234$ was computed to compare SAC to control subjects.

Results

The mean age of the victims and healthy children were respectively 10 (range 3 to 16 years) and 11.3 (range 8 to 15 years). Most of the victims were examined within 72 hours following the abuse. Infection was determined in three cases of 24 SAC (12.5%). Then *Enterobius vermicularis* eggs were seen by Microscopy in x10 and photographed (figure 1 and 2). On the other hand, no infection was seen in any control group member. The seen ratio of enterobiasis was not significantly associated with sexual abuse history ($P=0.234$). No difference was seen in the two groups in terms of enterobiasis.



Figure 1. Eggs of enterobius vermicularis

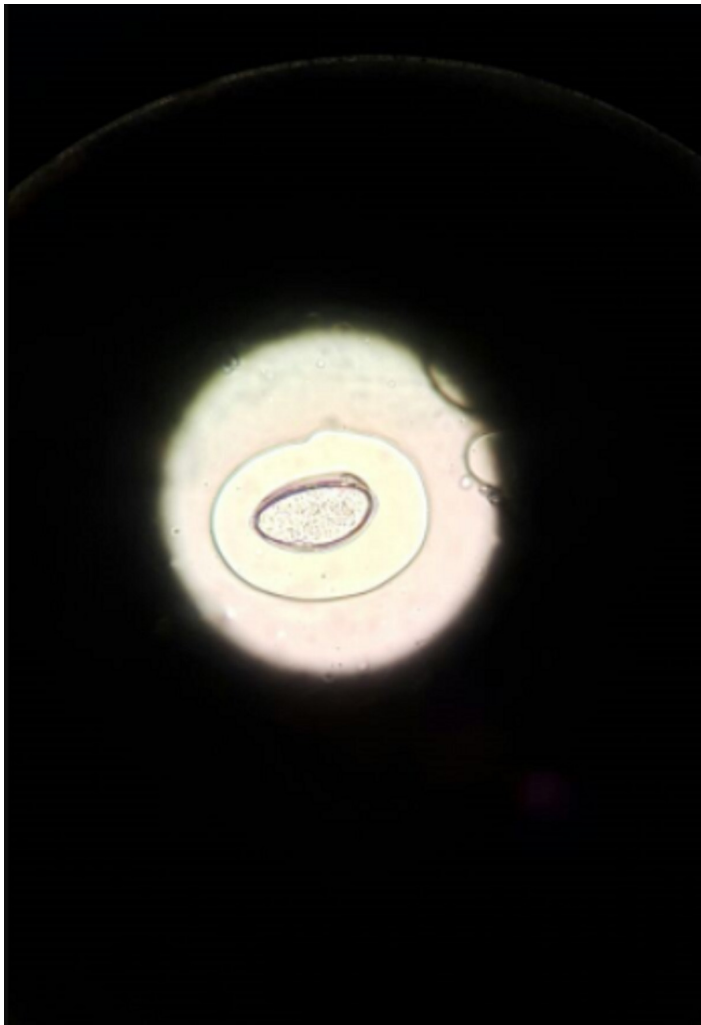


Figure 2. Eggs of enterobius vermicularis

Discussion

Sexual assault against children is having important due to not rarely seen worldwide. The abuse can be performed in different ways as vaginal, oral, and anal. In this study, we focused on the SAC cases with anal rape. However, the examination of anal rape is a common problem in victims of both genders. A study about anogenital injury due to sexual abuse including nearly 3000 patients reported that 11.4% of patients suffered from anal injury [12]. Another study about anogenital injury including 220 patients suggested that 3% of patients suffered from anorectal injury [13].

Anal rape findings are laceration, damage of anal sphincter muscle, ring style ecchymosis, anal warts, and reddening, etc. If the perpetrator used a lubricant product, threat the victim, too much time pass till the examination, any sign of abuse would not determinate. Although anal findings can not be reliable to determine sexual abuse, it is still used by the legal system to prove the assault [14]. Swelling, skin folds, and reddening usually can be seen for a week after the sexual abuse. On the other hand reflex anal dilatation, laceration; decreased anal tone can be determined till six months [14].

In the literature, many studies were performed to diagnose the medical rape examination in more accuracy. Some conditions that provide true diagnose of medical rape examination were evaluated.

Marilyn et al suggested that skin color can be important during the rape examination. However, ethnicity is not a demonstrative factor for the anus and internal genitalia [15].

A special condition that is reddening or anus due to itching is an important factor. It is known that one of the parasitic diseases that cause anal pruritus is enterobiasis. Sometimes an infected person with enterobiasis, can scratch the perianal region and make a reddening in the anal region mimicking sexual abuse. The examiner always should consider this possibility. We aimed to search this possibility is seen in which rate.

Our study has a few limitations such as the anatomic variants of survivor's perineum, usage of lubricants, time of sexual encounter, constipation, size of penetrating object or penile, condom usage of the perpetrator. Evaluation of SAC cases is depending on only direct visual inspection in our center. We have neither a colposcopy device nor a background of using the toluidine-blue contrast application. We performed the transparent tape method once per case not a few times. In normal clinical practice, the transparent tape method should be performed three times to rule out the infection [9]. Because our cases are a special population who were abused and we can not invite them to our center again and again. It could be traumatic for the survivors.

It can be said that making a diagnose of abuse may not be easy due to its unclear findings and insufficient proof. Silva et al. reported that the victims whose symptoms were supported by material evidence were almost 10% of all cases [16]. A study including 828 abused children reported that almost three-quarters of victims were female [16]. On the other hand, it is known that the number of male victims is not less.

Pau-Charles et al. wanted to draw attention to suspicious anogenital lesions as well as lichen sclerosis, vulvar pemphigoid, enterobiasis, scabies, psoriasis, contact, and atopic dermatitis, candidiasis, and perianal streptococcal dermatitis. They also pointed to the importance of making a good differential diagnosis [17].

Adams claimed that the cause of uncertain sexual assault findings is derived from most of the abused children who do not have a serious injury of genitalia or anus [18]. Unclear symptoms of examination can be confusing for the forensic medicine specialist who prepares the expert report for legal cases.

A study is based on anal signs of sexually abused children revealed that the frequency of anal reddening is 30% in victims and 8,3% in control group members [14]. It can be said that anal reddening is commonly seen during the genital examination.

In light of our findings, anal findings of rape examination are caused by an enterobiasis in 12.5% can be said. For this reason, the practitioner should consider this possibility during the examination of the genitalia. Our study draws attention to the relevance between the causes of anal reddening including enterobiasis and sexual assault. The present study also aimed to point out SAC cases.

Conflict of interests

The authors declare that they have no competing interests.

Financial Disclosure

All authors declare no financial support.

Ethical approval

Approval was obtained from the ethics committee of University of Health Sciences, Bursa Yüksek İhtisas Training and Research Hospital for the study (2011-KAEK- 25 2016/21-11).

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