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A prospective comparative study of the effect of video education on pain and anxiety in patients undergoing TRUS-guided prostate biopsy

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Abstract

Background: This study aimed to evaluate the effects of dynamic video education compared to static images and verbal information on pain perception and anxiety in patients undergoing transrectal ultrasound-guided prostate biopsy (TRUS-Bx). **Methods**: A prospective comparative study was conducted including patients scheduled for TRUS-Bx. Participants were assigned to three groups: control (verbal information), video (verbal plus dynamic video), and image (verbal plus static images). Pain intensity was measured using the Visual Analog Scale (VAS), and anxiety was assessed with the State-Trait Anxiety Inventory (STAI) before and after the procedure. Statistical analyses were performed using SPSS software. Depending on data distribution, group comparisons were conducted using either the Kruskal-Wallis test or Analysis of Variance (ANOVA). An a priori power analysis was performed using G*power to determine the appropriate sample size. A p-value of < 0.05 was considered statistically significant. **Results**: A total of 223 male patients undergoing TRUS-Bx were included in the study, with 73 (32.7%) in the Control Group, 83 (37.2%) in the Video Group, and 67 (30.1%) in the Image Group. Post-procedural pain levels increased significantly in all groups. The video group reported significantly lower pain scores compared to the image group ($p = 0.004$), indicating the effectiveness of dynamic video education in reducing pain perception. Significant differences were observed in post-procedural state anxiety (STAI-1), with a p-value of 0.041 between groups and anxiety increased after the procedure overall. **Conclusions**: Dynamic video education significantly reduces pain perception during TRUS-Bx but does not have a significant impact on acute procedural anxiety. **Clinical Trial Registration**: The study was retrospectively registered with ClinicalTrials.gov as: NCT07156747.

Keywords

Prostate biopsy; Video education; Pain perception; Anxiety; Patient preparation

Un estudio comparativo prospectivo del efecto de la educación en video sobre el dolor y la ansiedad en pacientes que se someten a una biopsia de próstata guiada por TRUS

Resumen

Antecedentes: Este estudio tuvo como objetivo evaluar los efectos de la educación mediante video dinámico en comparación con imágenes estáticas e información verbal sobre la percepción del dolor y la ansiedad en pacientes sometidos a biopsia de próstata guiada por ultrasonido transrectal (TRUS-Bx). **Métodos**: Se realizó un estudio comparativo prospectivo que incluyó a pacientes programados para TRUS-Bx. Los participantes fueron asignados a tres grupos: control (información verbal), video (verbal más video dinámico) e imagen (verbal más imágenes estáticas). La intensidad del dolor se midió utilizando la Escala Visual Analógica (EVA), y la ansiedad se evaluó con el Inventario de Ansiedad Estado-Rasgo (STAI) antes y después del procedimiento. Los análisis estadísticos se realizaron utilizando el software SPSS. Dependiendo de la distribución de los datos, las comparaciones entre grupos se realizaron utilizando la prueba de Kruskal-Wallis o ANOVA. Se realizó un análisis de potencia a priori utilizando G*power para determinar el tamaño de muestra adecuado. Un valor p de < 0.05 se consideró estadísticamente significativo. **Resultados**: Un total de 223 pacientes masculinos sometidos a TRUS-Bx fueron incluidos en el estudio, con 73 (32.7%) en el Grupo de Control, 83 (37.2%) en el Grupo de Video, y 67 (30.1%) en el Grupo de Imagen. Los niveles de dolor post-procedimiento aumentaron significativamente en todos los grupos. El grupo de video informó puntuaciones de dolor significativamente más bajas en comparación con el grupo de imágenes ($p = 0.004$), lo que indica la efectividad de la educación dinámica en video para reducir la percepción del dolor. Sin embargo, no se observaron diferencias significativas en la ansiedad estado post-procedimiento (STAI-1), con un valor p de 0.041 entre los grupos, aunque la ansiedad aumentó en general después del procedimiento. **Conclusiones**: La educación dinámica en video reduce significativamente la percepción del dolor durante la TRUS-Bx, pero no tiene un impacto significativo en la ansiedad aguda del procedimiento. **Registro del Ensayo Clínico**: El estudio fue registrado de forma retrospectiva en ClinicalTrials.gov con el identificador: NCT07156747.

Palabras Clave

Biopsia de próstata; Educación en video; Percepción del dolor; Ansiedad; Preparación del paciente

1. Introduction

Prostate cancer is one of the most commonly diagnosed malignancies and the second leading cause of cancer-related death among men globally [1]. Early detection through effective diagnostic strategies is vital for improving patient outcomes. Transrectal ultrasound-guided prostate biopsy (TRUS-Bx) remains a cornerstone in diagnosing suspected prostate cancer due to its accessibility, cost-effectiveness, and diagnostic yield [2]. However, despite being minimally invasive, TRUS-Bx often leads to significant patient anxiety. This anxiety may stem from fear of pain, cancer diagnosis, or unfamiliarity with the procedure [3].

In today's digital age, patients frequently turn to the internet for health-related information prior to medical procedures [4]. Video-sharing platforms like YouTube are increasingly popular, offering visual, easily accessible content. Many patients watch procedural videos to better understand what to expect, reflecting a growing trend toward patient engagement. However, the quality and tone of these videos vary widely. Some may be graphic or misleading, potentially increasing anxiety instead of alleviating it [5].

Preoperative anxiety can negatively impact clinical outcomes. Elevated anxiety levels may impair patient cooperation, heighten pain perception, and alter physiological responses such as heart rate and blood pressure. Furthermore, anxiety can reduce patient satisfaction and deter future medical engagement. Therefore, reducing pre-procedural anxiety through effective education is a critical objective in procedural medicine. Educational tools such as verbal counseling, brochures, and visual aids have been used with varying success. Among these, video-based education stands out by combining visual and auditory elements, which may enhance comprehension and retention. Previous studies in procedures like colonoscopy and surgery suggest that educational videos improve understanding, reduce anxiety, and increase patient satisfaction [6–8]. However, limited research has explored the specific impact of video-based education on patients undergoing TRUS-Bx. In particular, the comparative effects of dynamic videos versus static images or verbal information remain unclear [9].

We hypothesize that dynamic video content may better prepare patients and reduce psychological distress compared to static images or verbal explanations alone. Understanding the influence of visual exposure before the procedure can help clinicians optimize patient education strategies and improve the overall procedural experience.

We aimed to evaluate the impact of watching TRUS-Bx-related videos—especially on platforms like YouTube—on patient anxiety and perceived pain.

2. Materials and methods

This prospective comparative study was conducted in the Urology Department of Health Sciences University, Ankara Etlik City Hospital between January 2024 and December 2024. Ethics committee approval was obtained from the Ethics Committee of the Health Sciences University, Etlik City Hospital.

Ethical approval date and number: 22 November 2023-AEŞH-EK1-2023-100. After exclusions based on predefined criteria, eligible male patients scheduled for transrectal ultrasound-guided prostate biopsy (TRUS-Bx) were included in the study. The TRUS-Bx procedure was performed transrectally under periprostatic local anesthesia. A standard 12-core biopsy was taken from the patients (Right-6, Left-6). Informed consent was obtained from all patients, and the study was conducted in accordance with the ethical principles of the Helsinki Declaration.

2.1 Inclusion and exclusion criteria

Men between 50 and 80 years of age with elevated prostate-specific antigen (PSA) levels and/or suspicious digital rectal examination (DRE) findings who were scheduled for TRUS-guided prostate biopsy were considered eligible. Patients were excluded if they had a history of previous prostate biopsy, cognitive or psychiatric disorders, were using anxiolytic medications, or declined to participate. We included patients who were literate and had the ability of understanding the visual, verbal, and digital materials presented in the study. This setting was described as "socioeconomic level appropriateness".

2.2 Group design

Participants were divided into three groups. The control group (Control Group) received verbal information about the biopsy procedure. The video group (Video Group) received the same verbal explanation and also watched a short video about TRUS-Bx obtained from a commonly used video-sharing platform. The image group (Image Group) received verbal information along with still images illustrating the biopsy process. In this study, participants were not randomized. Instead, they were assigned to groups based on their educational level and comprehension capacity, in order to provide information in a way that best suited each patient's background and understanding. Thus, the term "socioeconomic level appropriateness" in this context primarily referred to the participants' ability to follow and benefit from the educational method (*e.g.*, video, still images, or verbal information). All educational interventions were delivered by the same trained urology nurse to ensure consistency. The video and image materials were pre-selected by a panel of urologists for clarity, accuracy, and educational value.

2.3 Measurement and assessment tools

Anxiety and pain levels were assessed using the State-Trait Anxiety Inventory (STAI) and the Visual Analog Scale (VAS). The STAI is a self-reported questionnaire consisting of two components: STAI-1 evaluates state anxiety, reflecting a temporary emotional condition in response to a specific situation, whereas STAI-2 assesses trait anxiety, which indicates a general tendency to experience anxiety in various contexts [10]. The VAS is a linear scale used to quantify perceived pain intensity, ranging from 0 (no pain) to 10 (worst possible pain), on which patients mark the level that best reflects their experience [11]. All measurements were taken in a quiet room half an hour before and half an hour after the biopsy procedure.

2.4 Statistical analysis

All statistical analyses were performed using SPSS Statistics version 20.0 (IBM, Newyork, NY, USA). Continuous variables were expressed as mean ± standard deviation, and categorical data as frequencies and percentages. Group comparisons were made using the Kruskal-Wallis test for non-parametric data and ANOVA for normally distributed data. *Post-hoc* pairwise comparisons were conducted using the Mann-Whitney U test with Bonferroni correction. A p-value < 0.05 was considered statistically significant. A priori power analysis was conducted using G*power software version 3.1.9.7 to determine the adequate sample size. Assuming an alpha (α) level of 0.05 and a beta (β) level of 0.20 (power of 80%), and an effect size (Cohen's f) of 0.40, it was calculated that approximately 26 participants per group (78 in total) would be required to detect meaningful differences between the three groups.

3. Results

A total of 223 male patients undergoing transrectal ultrasound-guided prostate biopsy (TRUS-Bx) between January 2024 and December 2024 were included in the study. Despite the G*power (3.1.9.6, Franz Faul, Universität Kiel, Kiel, SH, Germany) analysis indicating that 78 participants were enough, a total of 223 patients were included in the trial within the specified period to enhance its strength, due to the center's high patient volume. The total number of patients was distributed among the groups as follows: 73 (32.7%) in the Control Group, 83 (37.2%) in the Video Group, and 67 (30.1%) in the Image Group. Demographic characteristics were similar among the groups. The mean age of participants was 66.47 ± 7.05 years, and the mean prostate-specific antigen (PSA) level was 21.55 ± 68.96 ng/mL. There were no statistically significant differences between the groups in terms of age, PSA levels ($p > 0.05$), confirming comparability at baseline. These data are summarized in Table 1.

Pain perception was assessed using the VAS both before and after the biopsy procedure. Across all groups, post-procedural VAS scores showed a statistically significant increase compared to pre-procedural scores ($p = 0.001$), indicating that the biopsy procedure itself caused an increase in perceived pain. When comparing post-procedural pain scores between groups, a significant difference was found ($p = 0.019$). Specifically, there was no significant difference between the control group and the video group ($p = 0.345$), nor between the control group and the image group ($p = 0.096$). However, a significant difference was observed between the video and image groups ($p = 0.004$), with the video group reporting lower pain perception than the image group. This suggests that watching the video before the procedure may have a beneficial effect on reducing the pain experienced during the biopsy. These findings are summarized in Tables 2.1 and 2.2.

Anxiety levels were evaluated using the State-Trait Anxiety Inventory (STAI), which measures temporary anxiety (STAI-1) and general anxiety disposition (STAI-2). Pre-procedural

TABLE 1. Demographic and baseline characteristics of study groups.

Characteristic (n = 223)	Control Group (n = 73)	Video Group (n = 83)	Image Group (n = 67)	*p*-value
Number of patients (%)	73 (32.7%)	83 (37.2%)	67 (30.1%)	-
Age (yr) (Mean ± SD)	65.9 ± 7.1	66.8 ± 7.0	66.7 ± 7.1	0.68
PSA (ng/mL) (Mean ± SD)	20.8 ± 68.0	21.9 ± 69.5	22.0 ± 69.8	0.81

PSA: Prostate-Specific Antigen; SD: Standard Deviation.

TABLE 2.1. Comparison of VAS scores before and after biopsy among study groups.

Group	Pre-procedural VAS (Mean ± SD)	Post-procedural VAS (Mean ± SD)	*p*-value (pre *vs.* post)
Control Group	0.21 ± 0.62	2.31 ± 2.26	0.001
Video Group	0.44 ± 0.90	1.47 ± 0.97	0.001
Image Group	0.65 ± 1.23	2.25 ± 1.68	0.001
Between-group comparison (post-VAS)	-	-	0.019
Total	0.43 ± 0.95	2.04 ± 1.76	0.001

VAS: Visual Analog Scale; SD: Standard Deviation.

TABLE 2.2. Pairwise comparison of post-procedural VAS scores.

Group Comparison	*p*-value
Control *vs.* Video	0.345
Control *vs.* Image	0.096
Video *vs.* Image	0.004

STAI-1 scores were comparable among groups. However, a statistically significant difference was noted in STAI-2 scores ($p = 0.012$), indicating variability in trait anxiety across groups prior to the procedure. Post-procedural STAI-1 scores differed significantly between groups ($p = 0.041$), although the clinical relevance of this difference may be limited. Nevertheless, when pre- and post-procedural STAI-1 scores were compared within each group, a significant increase was observed ($p = 0.001$). This finding demonstrates that the biopsy procedure itself elevated temporary anxiety levels regardless of the educational intervention. These findings are summarized in Table 3.

4. Discussion

This prospective comparative study assessed the impact of different visual educational tools on pain perception and anxiety among patients undergoing transrectal ultrasound-guided prostate biopsy (TRUS-Bx). Our findings demonstrated that while the biopsy procedure itself significantly increased both pain and anxiety levels across all patients, the group exposed to dynamic video education reported significantly lower post-procedural pain scores compared to the group receiving static images. However, neither video nor image interventions resulted in a significant reduction in post-procedural state anxiety. These results provide valuable insights into the nuanced effects of pre-procedural education and highlight the complexities in managing patient psychological burden during invasive diagnostic procedures.

The baseline demographic parameters of the patients, categorized into three categories, were analogous. No significant difference was observed in age or PSA levels. This uniformity is essential for relating differences in outcomes primarily to the educational intervention instead of demographic confounding factors.

Pain, measured by the VAS, increased significantly post-procedure in all groups. However, between-group comparison revealed a significant overall difference in post-procedural pain levels. The video group reported a mean post-biopsy VAS score of 1.47 ± 0.97, which was lower than the image group's 2.25 ± 1.68, suggesting that dynamic visual education may facilitate better pain coping mechanisms. Although the control group's mean post-procedural pain score (2.31 ± 2.26) did not differ significantly from either the video or image groups, there was a tendency toward lower pain scores in the video group. Lee *et al.* [12] demonstrated that video-based education significantly improves pain self-efficacy in postoperative orthopedic surgery patients, leading to better pain management and recovery outcomes. Their quality improvement project showed that a 15-minute educational video increased patients' confidence in managing postoperative pain, highlighting video education as a time-efficient and cost-effective method to enhance postoperative care and patient satisfaction. In another study conducted by Tarhan *et al.* [9], 246 patients who had transrectal biopsy were divided into two groups: one group received both written and video training, while the other group received only written training. The first STAI-2 results for both groups were similar. The STAI-1 scores before to the information were similar in both groups and considered high. Following the information session, STAI-1 scores decreased in both the video and written information groups. The beneficial impact of video education is apparent in this study. In a randomized clinical trial, the authors compared virtual reality-based education with tablet video education for children undergoing venipuncture. They found

TABLE 3. Distribution of STAI-1 and STAI-2 scores by groups.

Variable	Control Group (n = 73)	Video Group (n = 83)	Image Group (n = 67)	Total (n = 223)	*p*-value
Pre-procedural STAI-1	40.30 ± 10.83	38.85 ± 10.35	37.61 ± 9.09	38.95 ± 10.16	0.264
Pre-procedural STAI-2	45.63 ± 9.65	41.83 ± 8.50	42.47 ± 6.98	43.26 ± 8.64	0.012
Post-procedural STAI-1	42.32 ± 8.50	41.66 ± 10.70	43.70 ± 7.06	42.49 ± 9.02	0.041

p-values represent between-group comparisons (Kruskal-Wallis test). A significant increase in STAI-1 scores from pre- to post-procedure was observed within each group (p = 0.001, Wilcoxon test). STAI: State-Trait Anxiety Inventory.

that immersive virtual reality significantly reduced pain and distress compared to video-based education, highlighting the importance of engaging preprocedural educational methods in pain management. This supports the role of video education in improving patient experience during invasive procedures [13]. These findings support our results, suggesting that dynamic audiovisual preparation reduces pain perception by providing patients with a clearer, sequential understanding of what to expect during the procedure.

In contrast, anxiety levels assessed using the State-Trait Anxiety Inventory (STAI) showed a more complex pattern. Pre-procedural state anxiety scores (STAI-1) were similar across groups, but trait anxiety (STAI-2) differed significantly, with the video group having slightly higher baseline anxiety. This difference, likely due to random distribution, may have influenced the outcomes and underscores the challenge of fully controlling psychological baseline traits in clinical trials. Post-procedural state anxiety increased significantly compared to pre-procedural levels within each group, indicating that undergoing TRUS-Bx itself raises temporary anxiety regardless of preparatory interventions. However, no statistically significant difference was found between groups in post-procedure STAI-1 scores. In a study investigating anxiety levels in patients undergoing septorhinoplasty, no significant differences were found between groups in state (STAI-1) and trait (STAI-2a) anxiety scores; however, patients who received information closer to the surgery date showed significantly higher late trait anxiety (STAI-2b) scores. Similar to previous research highlighting the challenges of controlling baseline psychological traits in clinical settings, the authors concluded that longer-term communication between surgical teams and patients may reduce anxiety and improve patient satisfaction. These findings underscore the importance of timing and quality of preoperative information in effectively managing patient anxiety [14].

In a systematic review by Forbes *et al.* [15], nonpharmacological interventions, including video-based education, showed limited but promising effects in reducing procedural anxiety among adult cancer patients undergoing radiation therapy. The authors emphasized the scarcity of well-designed randomized controlled trials and the need for multifaceted strategies beyond education alone to effectively address cancer-related procedural anxiety. In a study by Parker *et al.* [16], fear of diagnosis, uncertainty, and procedural discomfort were found to contribute significantly to anxiety before prostate biopsy and require multifaceted support strategies. The differences in pain and anxiety modulation emphasize the necessity of separating cognitive sensory impressions from emotional states. While dynamic video education markedly diminishes pain perception, it fails to sufficiently deal with the complex emotional responses linked to fear and uncertainty in cancer. The emotional state is complex and resistant to simplistic manipulations. Supplementary assistance is essential for reducing emotional reactions and diminishing pain perception. The exhibition of educational films designed to enhance mental health concerning disorders, alongside informative movies outlining procedural techniques and soothing psychological support systems, provides a comprehensive strategy. Bozkurt and Kim *et al.* [17, 18] established that the incorporation of video instruction markedly diminished anxiety in patients having invasive surgery.

Limitations of this study include its single-center design, which may affect generalizability to diverse populations or healthcare settings. Our study groups were not created randomly. The clarity of patients' verbal, visual, and digital contents was characterized as "social status appropriateness". Participants achieving this qualifying criterion were included into the study. Additionally, the emotional tone and delivery style of the videos, which might impact individual patient reactions, were not systematically evaluated. Moreover, the lack of long-term follow-up limits conclusions on sustained effects of education on anxiety and patient satisfaction.

Future research should explore personalized educational content adapted to individual patients' baseline anxiety, educational background, and health literacy. Investigations into alternative formats such as animated videos, virtual reality, or interactive modules may enhance engagement and anxiety reduction further. Additionally, assessing the timing of video delivery—whether days prior or immediately before the biopsy—could optimize the preparatory effect.

5. Conclusions

This study confirms that TRUS-guided prostate biopsy induces significant pain and anxiety, with dynamic video education mitigating pain perception but not acute anxiety. This suggests that well-designed video content should be incorporated into patient education protocols to improve procedural comfort. However, comprehensive anxiety management may require integrating psychological interventions beyond educational materials to fully address patients' emotional needs during prostate cancer diagnostic processes.

AVAILABILITY OF DATA AND MATERIALS

The corresponding author will provide the required data upon reasonable request.

AUTHOR CONTRIBUTIONS

FS and ASE—Project development. FS, MA, BYE and MAI—Data collection. FS, HS, BYE and MAI—Data analysis. FS, MA and MAI—Manuscript writing and editing. MAI, FS and HS—General supervision of the research. All authors reviewed the manuscript. The final version of the manuscript is approved by all contributing authors.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethics committee approval was obtained from the Ethics Committee of the Health Sciences University, Etlik City Hospital. Ethical approval date and number: 22 November 2023-AEŞH-EK1-2023-100. The consent statement form was obtained from all patients.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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