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The Middle Black Sea Journal of Health Science, which is international journal, is published by Ordu University Institute of Health Sciences on behalf of the Middle Black Sea Universities Collaboration Platform

Aims and Scope

Middle Black Sea Journal of Health Science is an international journal that publishes original clinical and scientific research. Middle Black Sea Journal of Health Science, published by Ordu University, publishes basic innovations in health education, case reports, reviews, letters to the editor, case reports and research articles.

The aim of the journal is to contribute to the international literature with clinical and experimental research articles, case reports, reviews and letters to the editor in the field of health sciences.

The target audience of the journal is all scientists working in the field of health, graduate students and researchers in this field.

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The publication language of the journal is English. The journal is published every three months, in February, May, August and November, and four volumes are completed.

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No fee is charged from the authors for the evaluation and publication of the article.

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Middle Black Sea Journal of Health Science

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Ethics Committee Approval: Ethics committee approval was received for this study from ……. Clinical Research Ethics Committee of …… University (No…….).

Author Contributions: Concept: …….., Design: …….., Literature search:……..... Data Collection and Processing: ……..., Analysis and Interpretation:……, Writing - …….

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Chapter in Edited Book: Hornbeck P. Assay for antibody production. In: Colign JE. Kruisbeek AM, Marguiles DH, editors. Current Protocols in Immunology. New York: Greene Publishing Associates; 1991. p. 105-32.

Book with a Single Author: Fleiss JL. Statistical Methods for Rates and Proportions. Second Edition. New York: John Wiley and Sons; 1981. p. 105-32.

Editor(s) as Author: Balows A. Mousier WJ, Herramaflfl KL, editors. Manual of Clinical Microbiology. Fifth Edition. Washington DC: IRL Press. 1990. p. 105-32.

Conference Paper: Entrala E, Mascaro C. New structural findings in Cryptosporidium parvum oocysts. Eighth International Congress of Parasitology (ICOPA VIII); October 10-14; Izmir-Turkey: 1994. p. 1250-75

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a) Original research: Prospective, retrospective and all kinds of experimental studies

Structure

Title

Abstract should be structured with subheadings (Objective, Methods, Results, and Conclusion) (average 200-400 word)

Key words

Introduction

Methods

Results

Discussion

Conclusion

Acknowledgements

References (most 40)

Whole text should not exceed 4500 words except for resources and English summary.

b) Short papers: Prospective, retrospective and all kinds of experimental studies

Structure

Title

Abstract should be structured with subheadings (Objective, Methods, Results, and Conclusion) (average 200-400 word)

Key Words

Introduction

Methods

Results

Discussion

Conclusion

Acknowledgements

References (most 20)

Whole text should not exceed 2700 words except for resources and English summary.

c) Case Report: They are rarely seen articles which differs in diagnosis and treatment. They should be supported by enough photographs and diagrams.

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Title

Abstract (average 100-300 word)

Key words

Introduction

Case report

Discussion

Conclusion

Acknowledgements

References (most 20)

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d) Review articles

Structure

Title

Abstract (average 200-400 word)

Key words

Introduction

The compilation text also including appropriate sub-headings,

Conclusion

Acknowledgements

References (most 50)

Whole text should not exceed 6550 words except for resources and English summary.

Middle Black Sea Journal of Health Science

AUGUST 2024 **VOLUME 10** **ISSUE 3**

CONTENTS

EDITORIAL

Dear Readers

We are delighted to present to you the third issue of 2024. In this special edition of our journal, which reflects the light of the scientific world, we have included the latest and most significant research in the fields of dentistry, urology, and psychiatry. The dedicated work of our esteemed scientists in these areas has made substantial contributions to the literature, introducing important innovations.

This issue features a wide range of articles, from clinical practices in dentistry to management of urological diseases and psychiatric evaluations, carefully selected to help you stay updated with the developments and advancements in these fields. As a community that believes in the power of scientific knowledge and research, we hope this issue will be both informative and inspiring for our readers.

We extend our heartfelt thanks to all the scientists who contributed to this issue. Their effortsand shared valuable insights provide a solid foundation for both current and future research.

We look forward to meeting you again in our future issues. Until then, stay in the world of science and farewell.

Sincerely,

Prof. Dr. Ülkü KARAMAN

Editor

Middle Black Sea Journal of Health Science / Mid Blac Sea J Health Sci **August 2024; 10(3): 239-254**

ORGINAL ARTICLE **DOI:** 10.19127/mbsjohs.1514532

Impact of Psychoeducation Applied to The Spouses of Bipolar Patients on Their Emotional Expression, Stigmatization, and Loneliness Levels

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Abstract

Objective: Bipolar disorder (BD) is a serious burden for patients and family members due to recurrent mood episodes, hospitalizations, and loss of productivity. The goal of this study is to examine how psychoeducation affected the caregivers of bipolar patients' levels of emotional expression, stigmatization, loneliness, and mood symptoms.

Method: This research is a quasi-experimental intervention study applied as a pretest-posttest design with a control group. The study included 20 patients with bipolar diagnosis and 20 caregiver spouses who were followed up in our outpatient clinic. Participants were divided into 2 groups as study and control group. The spouses in the control group were interviewed only to evaluate their situation. The study group received a 6-session (15 hours) psychoeducation intervention. We administered the Emotion Expression Scale (EES), Self-Stigma Inventory for Families(SSI-F), UCLA Loneliness Scale (UCLA-LS), and DASS-21 Scale to the spouses of bipolar patients in the study and control groups before and after the psychoeducation program

Results: The mean age of the spouses in the study group was 43.4±7.04 years, the mean age of the spouses in the control group was 39±8.29 years and all of them were female. There was no significant difference between the mean scores of the SSI-F, DASS-21 and EES scales of the spouses in the study and control groups before the training ($p>0.05$). After the psychoeducation program was applied to the spouses in the intervention group, a significant decrease was observed in the SSI-F, EES, and DASS-21 scores ($p<0.001$, $p<0.001$, $p=002$, $p=001$, respectively). Although there was a decrease in UCLA-AS scores, it was not significant ($p=.061$)

Conclusion: Our study observed a significant decrease in the stigmatization, emotional expression, depression, and anxiety scores of the patients' spouses who participated in the intervention. Based on this result, it may be recommended to continue psychoeducation systematically in clinical practice.

Keyword: Bipolar disorder, stigmatization, emotional expression, loneliness, stress, depression, and anxiety

Suggested Citation Kocakaya H, Arslan K. Impact of psychoeducation applied to the spouses of bipolar patients on their emotional expression, stigmatization, and loneliness levels. Mid Blac Sea Journal of Health Sci, 2024;10(3):239-254.

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INTRODUCTION

Bipolar disorder (BD) is a chronic psychiatric illness characterized by recurrent depressive, manic, or hypomanic episodes, affecting approximately 1% of the population (1). Psychotropic drugs play a central role in the disease's treatment. However, despite regular treatment, approximately half of the patients continue to experience mood symptoms, which negatively affect functioning and quality of life (2,3). Relatives play a central role in referring bipolar patients to health services, ensuring regular follow-up, and supporting patients' compliance with treatment (4). In this respect, bipolar disorder ranks third in Europe among the illnesses that cause the greatest family burden (5). Caregivers often report high levels of subjective burden (feelings of guilt, anger, anxiety, and stress) and objective burden (time and finances) (6,7). Such feelings developed towards patients are defined as expressed emotions (EE). Emotional expression is defined as "criticism of the patient, presence or absence of hostility towards the patient, evaluation of closeness to the patient, excessive altruism and interventionism of relatives in their relations with the patient, and inability to separate their inner world from that of the patient" (8). Research indicates that a high level of emotional expression among family members may contribute to the onset of mental illness and is closely associated with the prognosis and relapse of the illness (9).

Stigmatization is another common social challenge that bipolar individuals face. Stigmatization is the disrespectful labeling or attribution of shameful and discrediting characteristics by society because an individual is seen as outside the criteria that society considers "normal"(10). Moreover, family members are aware that social stigmatization and devaluation affect not only their patients but also themselves (11). This awareness causes some family members to struggle and become stronger, but it also causes others to internalize stigmatization and stigmatize themselves (12). To avoid stigmatization, patients' relatives use various strategies. While some relatives conceal their mental disorders, others avoid socializing with family and friends (11). A recent study reported that families of people with serious mental illness experience rejection, avoidance, disrespect, and mistreatment in interpersonal communication and daily life because of their relationship with the sick family member (13). This situation leads to shame, a feeling of inadequacy, an increase in negative thoughts, a decrease in self-worth, and the avoidance of social relationships

in patients and their relatives. This circumstance causes the patient's relatives to lose social support and become eventually lonely (14).

We recognize the necessity of supporting caregivers, given their essential role in the treatment process and the critical emotional support they supply in bipolar disorder (4). This view is supported by the study reporting that caregivers experience depression when they do not receive adequate social support (13). In this context, health professionals should support caregivers to identify caregiver challenges and provide culturally compatible care. Research on group-based psychoeducation for caregivers alone is limited, despite widespread recommendations for group educational programs as a useful strategy to support and inform caregivers. According to one study, psychoeducation improved caregivers' communication with their patients, decreased their emotional expressions, and lessened their sense of burden and difficulties (15).

The goal of this study is to examine how psychoeducation affected the caregivers of bipolar patients' levels of emotional expression, stigmatization, loneliness, and mood symptoms.

Hypotheses

Primary: Applying psychoeducation to the spouses of bipolar patients lessens their feelings of stigma and loneliness.

Secondary: Psychoeducation reduces anxiety and depression levels as it strengthens coping skills during periods of illness.

METHODS

Study Design and Population

This research is a quasi-experimental intervention study applied as a pretest-posttest design with a control group.

In order to form the sample group for our study, a list of relatives of patients who were followed up in the psychiatry outpatient clinic with a diagnosis of BD, who were in remission for at least one year, and who continued to care for the patient as primary caregivers was prepared. We selected female spouses of bipolar patients aged between 18 and 45 years from the list. We used the Cohen sample size tables to determine the number needed for the study. Accordingly, 14 subjects were proposed to test the research hypothesis with a Type I error probability of less than 0.05 and to show a moderate effect with a power of 0.80. Of the thirty spouses of bipolar patients on our list, we assigned twenty people who agreed to participate in our study to the experimental and control groups by lottery. Since two of the ten caregivers in the control group withdrew from the study, the study was conducted with eighteen patients and their caregiver spouses. We determined the inclusion criteria for caregivers as being between the ages of 18 and 45, having the mental capacity to follow the study's instructions, being able to

understand the questions asked, not having hearing or vision problems, and continuing the patient's care as a primary caregiver for at least one year.

The non-interventional studies ethics committee of the Kırıkkale University Faculty of Medicine granted permission for the study.

After obtaining the necessary permissions for the research, the "Expressed Emotion Scale", "Self-Stigma Inventory for Families", "UCLA Loneliness Scale" and "DASS-21" were applied to the spouses of bipolar patients in the intervention and control groups before psychoeducation. We applied a standard and structured psychoeducation program to the intervention group, and only conducted interviews with the control group to assess their status. We implemented the psychoeducation program twice a week in 60–90-minute sessions, with a fifteen-minute break in between. Psychoeducation was applied to ten caregivers in a total of 6 sessions (15 hours). During the psychoeducation, a psychiatrist and a social worker educated the patients' spouses about the disease, how to anticipate attack symptoms, how to intervene during attack periods, how to use and manage medications, how to cope with problems, how to train social skills, how to manage stress, and how to provide social support and social rights. After psychoeducation, the "Emotion Expression Scale", Self-Stigma Inventory for Families", ”UCLA Loneliness Scale" and "DASS 21” Scale" were applied to the intervention group.

Data Collection

Sociodemographic Data Form: This form asks about the patient's age, gender, marital status, educational status, employment status, and presence of psychiatric illness in their spouses.

Expressed Emotion Scale (EES): The development of this tool aimed to evaluate the negative emotional attitudes and behaviors of relatives towards patients. The validity study for our country was conducted by Berksun. The scale, which consists of 41 questions, features subscales for criticality/hostility and over-interference-protective-caring-interventionism. Higher scores obtained from the scale mean that emotional expression is high. Cronbach alpha reliability coefficient of the scale is 0.89 (16, 17).

Self-Stigma Inventory for Families (SSI-F): Yildiz et al. developed the SSI-F, a self-report measure, to assess the stigmatized family members of schizophrenia patients. It is a 14-item self-assessment scale with a 3-factor structure (concealed devaluation, social disengagement, and disease concealment). Higher scores indicate greater self-stigmatization. Since there is no Turkish self-stigma scale for the families of BD patients, we used the SSI-F for this group as well. The Cronbach’s alpha coefficient of the scale was 0.88 (18).

UCLA Loneliness Scale: There are a total of 20 items on the four-point Likert-type scale, 10 of which are straight and the remaining 10 reversed. Each item on the scale presents a situation that reflects a feeling or thought about social relations, and evaluates how frequently the individual experiences this situation. In scoring, items containing positive statements (1,4,5,5,6,9,10,15,16,19,20) are often scored as appropriate=1, sometimes appropriate=2, rarely appropriate=3, never appropriate=4, and items containing negative statements (2,3,7,7,8,11,12,13,14,17,18) are scored in the opposite way as often appropriate=4, sometimes appropriate=3, rarely appropriate=2, never appropriate=1. The individual's total scale score is obtained by summing the scores obtained from all items. As the score increases, the level of loneliness increases.

Depression-Anxiety-Stress Scale (DASS-21): The scale, abbreviated DAS-42, is used to measure anxiety, depression and stress. Sarıçam et al. conducted the validity and reliability study for Turkey. This scale is a 4-point Likert-type scale and consists of seven questions each measuring 'depression, stress and anxiety dimensions'. An individual's score of 5 points and above from the depression sub-dimension, 4 points and above from anxiety, and 8 points and above from stress indicates that he/she has a illness (21)

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Statistical analysis

Percentage, standard deviation and arithmetic mean were used to evaluate demographic data. Shapiro-Wilk analysis was performed to evaluate the normality distribution of the data. The scale scores of the spouses of bipolar patients who participated in the study and control groups were normally distributed, and the mean and standard deviation scores were calculated by an independent sample t test. The pre-test and post-test mean scores of the study groups were compared with the paired sample t test and the p value was calculated and its significance at .05 level was analysed.

RESULTS

The mean age of the spouses of bipolar patient who participated in the study group was 43.4±7.04 years, all of them were female, the educational status of 50% was primary school, the income status of 80% was medium, 70% had chronic disease. The mean number of hospitalizations of bipolar patients in the study group was 3.5±5.87, the mean number of depression attacks was 6±2.26, the mean number of manic attacks was 2.4±2.01, and the mean disease duration was 18.3±9.71 years.

The mean age of the spouses of bipolar patient participating in the control group was 39±8.29 years, all of them were female, the educational status of 50% was high school, the income status of 75% was medium, all of them had no chronic disease. The mean number of

hospitalizations of bipolar patients in the control group was 3.5±5.87, the mean number of depression episodes was 4.5±1.51, the mean number of manic episodes was 3.12±2.53, and the mean duration of illness was 11.37±8.24 years (Baseline caracteristics of participants were shown in Table 1).

There was no significant difference between the mean scores of the spouses in the study and control groups on the SSI-F, EES and DASS-21 before the training (p>0.05). The mean UCLA-LS score of the individuals in the study group before psychoeducation was 35±8.18, the mean UCLA-LS score of the control group was 24±3.58 and there was a statistically significant difference between them (Evaluation of the study and control groups in terms of scale scores before psychoeducation is shown in Table 2, p<0.05).

The mean SSI-F scores of the spouses in the study group before the training were 11.10±7.01 for the social withdrawal subscale, 7.2±3.52 for the disease concealment subscale, 10.00±3.97 for the perceived worthlessness subscale and 28.3±11.65 for the total SSI-F. The mean scores of the EES of the patients' spouses were 8.80±1.81 for the fondness subscale, 9.10±2.64 for the hostility subscale and 18.10±3.51 for the total EES score. DASS-21 mean scores were 5.80±3.26 for the stress subscale, 5.30±4.47 for the anxiety subscale and 5.80±4.47 for the depression subscale. The mean score of UCLA-LS was found to be 35±8.18 (The pre-test scores of the spouses of the study group patients were shown in Table 3).

The mean SSI-F scores of the spouses in the study group after the training were 8.30±4.88 for the social withdrawal subscale, 4.70±2.06 for the disease concealment subscale, 6.40±1.35 for the perceived worthlessness subscale and 19.50±6.29 for the total SSI-F score. The mean scores of the EES of the patients' spouses were 6.20±1.69 for the fondness subscale, 6.70±2.58 for the hostility subscale and 12.70±4.03 for the total EES score. The mean scores of DASS-21 were 3.00±1.94 for stress subscale, 3.00±3.13 for anxiety subscale and 3.70±4.19 depression subscale. The mean UCLA-LS was found to be 21.50±8.00 (The pre-test and post-test scale scores of the spouses of the study group patients were shown in Table 3).

To determine the effect of the psychoeducation programme for the spouses of bipolar patient on SSI-F, EES, DASS-21 and UCLA-LS, the difference between pre-test and post-test mean scores was examined by paired sample t test. After the psychoeducation programme applied to the spouses in the study group, a significant decrease was observed in SSI-F, EES, DASS-21 scale scores (p<0.001, p<0.001, p=002, p=001, respectively).

However, even though there was a decrease in UCLA-LS scores, it was not significant (p=.061). (The evaluation of the pre-test and

post-test scale scores of the spouses of bipolar patients by t test is shown in Table 4).

Table 1. Socio-demographic characteristics of patients' spouses in the study and control groups

Variables		**Study Group (SG)**		**Control Group (CG)**	
Education level		n	%	n	%
	Primary School	5	50	3	37.5
	Middle school	2	20	1	12.5
	High school	3	30	4	50
Income level					
	Low	2	20	1	12.5
	Centre	8	80	6	75
	High	-	-	1	12.5
Chronic illness					
	Yes	7	70	-	-
	No	3	30	8	100
Age		43.4 ±7.04		39±8.29	
Number of hospitalisation		3.5±5.87		0.75±1.39	
Number of episodes of depression		6±2.26		4.5±1.51	
Number of manic episodes		2.4±2.01		3.12±2.53	
Number of attacks		8.4±3.92		7.6±3.20	
Duration of illness		18.3±9.71		11.37±8.24	

Table 2. Evaluation of the study and control groups in terms of scale scores before psychoeducation with independent sample t test

Groups	**Scale (Pre-test) Mean (±SD)**	***t***	***P***
	SSI-F		
SG	28.30±11.65	1.816	.088
CG	20.37±4.34		
	EES		
SG	18.10±3.51	-.597	.559
CG	18.87±1.12		
	DASS-21-S		
SG	5.80±3.26	.859	.403
CG	5.12±6.15		
	DASS-21-A		
SG	5.50±4.40	.264	.796
CG	4.87±1.25		
	DASS-21-D		
SG	5.80±4.47	.859	.403
CG	4.37±1.50		
	UCLA-LS		
SG	35±8.18	3.526	.003
CG	24±3.58		

Abbreviations: SSI-F; Self-Stigma Inventory for Families, EES; Expressed Emotion Scale, DASS-21-S; DASS-21 Stress, DASS-21-A; DASS-21 Anxiety, DASS-21-D; DASS-21 Depression, UCLA-LS; UCLA Loneliness Scale, *p<0.05, **p<0.001

Table 3. Evaluation of the Pre-Test and Post-Test Scale Scores of patients' spouses in the Study Group

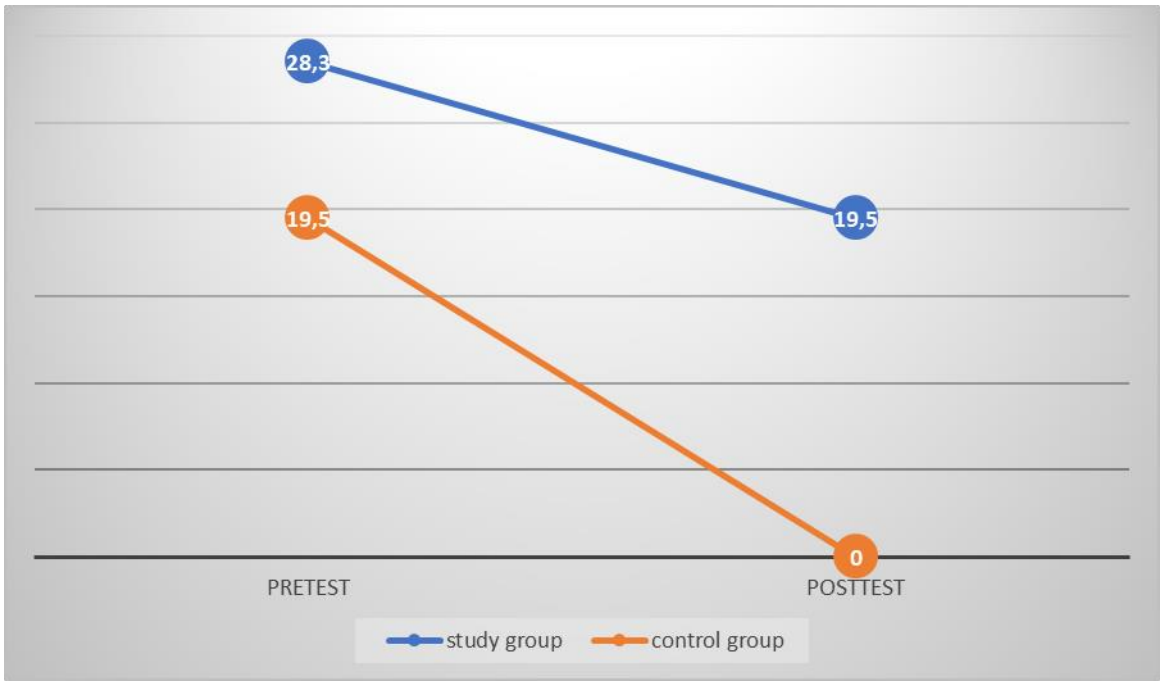
Scales	Group		Pre-test		Post-test	
SSI-F	SG	n	Mean	±SD	Mean	±SD
		10	28.3	11.65	19.50	6.29
SSI-F SW	SG	10	11.10	7.01	8.30	4.88
SSI-F DC	SG	10	7.2	3.52	4.70	2.06
SSI-F PW	SG	10	10	3.97	6.40	1.35
EES-Total	SG	10	18.10	3.51	12.70	4.03
EES-D	SG	10	8.80	1.81	6.20	1.69
EES-H	SG	10	9.10	2.64	6.70	2.58
DASS-21-S	SG	10	5.80	3.26	3.00	1.94
DASS-21-A	SG	10	5.30	4.40	3.00	3.13
DASS-21-D	SG	10	5.80	4.47	3.70	4.19
UCLA-LS	SG	10	35	8.18	21.50	8.00

Abbreviations: SSI-F; Self-Stigma Inventory for Families, SSI-F SW; Self-Stigma Inventory for Families Social Withdrawal subscale, SSI-F DC; Self-Stigma Inventory for Families Disease Concealment subscale, SSI-F PW; Self-Stigma Inventory for Families perceived worthlessness subscale, EES; Expressed Emotion Scale, DASS-21-S; DASS-21 Stress, DASS-21-A; DASS-21 Anxiety, DASS-21-D; DASS-21 Depression, UCLA-LS; UCLA Loneliness Scale.

Table 4. Evaluation of pre-test and post-test scale scores of spouses of bipolar patients by paired sample t test

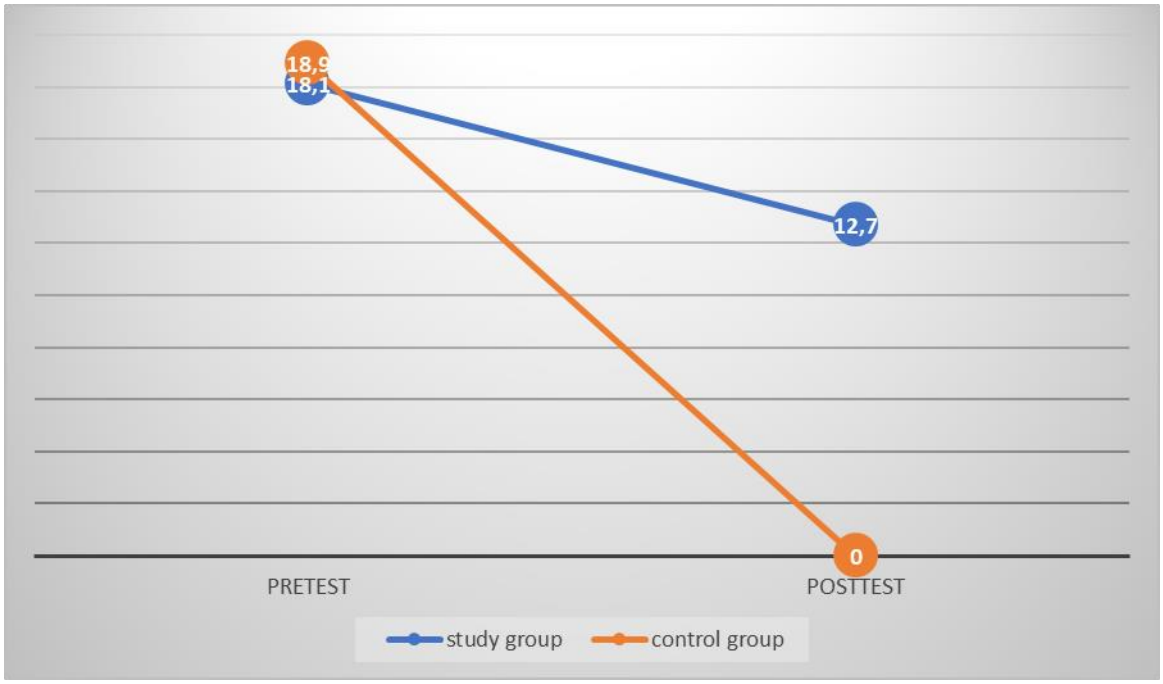
Scales	**Group**	**Pre-test post-test diffrence Mean (±SD)**	***t***	***p***
SSI-F	**SG**	**8.80±6.07**	**-4.534**	**<0.001****
	CG	**20.37±4.34**		
EES	**SG**	**5.40±1.43**	**-21.758**	**<0.001****
	CG	**18.88±1.12**		
DASS-21-S	**SG**	**2.80±1.62**	**-1.154**	**.265**
	CG	**5.12±6.15**		
DASS-21-A	**SG**	**2.30±1.57**	**-3.781**	**.002***
	CG	**4.87±1.25**		
DASS-21-D	**SG**	**2.10±.99**	**-3.854**	**.001***
	CG	**4.37±1.50**		
UCLA-LS	**SG**	**13.50±13.04**	**-2.023**	**.061**
	CG	**23.86±3.85**		

Abbreviations: SSI-F; Self-Stigma Inventory for Families, EES; Expressed Emotion Scale, DASS-21-S; DASS-21 Stress, DASS-21-A; DASS-21 Anxiety, DASS-21-D; DASS-21 Depression, UCLA-LS; UCLA Loneliness Scale, *p<0.05, **p<0.001



Graph 1. Evaluation of Self-Stigma Inventory for Families Scores of Patient spouses

In the study, the mean score of the Self-Stigma Inventory for Families Scale of the study group before the training was 28.30 and the mean score of the control group was 20.37; the mean score of the Stigmatization Scale of the study group after the training was 19.50.



Graph 2. Evaluation of Emotion Expression Scores of relatives of Spouses

In the study, the mean score of the Emotion Expression Scale of the study group before the training was 18.1 and the mean score of the control group was 18.9; the mean score of the Stigma Scale of the study group after the training was 12.70.

DISCUSSION

In general, it is reported that the majority of bipolar patients are either single or divorced as a result of relationship difficulties. However, a study in our country found that, depending on the culture, divorce rates were lower than in other studies (23). Furthermore, reports indicate that these individuals experience an increase in marital issues during attack periods, which they attribute to changes in their home environment and socioeconomic status (24). In this context, our study aimed to increase the level of knowledge about the disease and coping skills to reduce emotional expression, stigmatization, and loneliness by applying psychoeducation to the spouses of bipolar patients. In our study, we found that applying psychoeducation to caregivers significantly reduced stigmatization, emotional expression, depression, and anxiety scores. Although there was a decrease in the loneliness score, it was not significant.

BD is a significant burden for patients and family members due to recurrent mood episodes, hospitalizations, and loss of productivity (25). It has also been reported that caregivers' expectations of the patient's ability to control symptoms lead to more emotional expression (anger, shame, excessive interest) and worsening of the prognosis (6,7). Reports indicate that applying psychoeducational interventions to caregivers positively impacts patients' emotional expression and functionality (26). We applied six sessions (15 hours) of psychoeducation to the spouses of bipolar patients in our study. A significant decrease was observed in the emotional expression scale scores of the spouses of bipolar patients after psychoeducation intervention. A study assessed how a psychoeducational intervention for families affected the caregivers of bipolar patients. As a result, caregivers' knowledge about the disease increased, their subjective burden dropped, and their tendency to blame the relative's illness for life disruptions decreased (27). Another recent study reported that the relatives' emotional expression decreased after providing psychoeducation about the disease to 88 caregivers (28). As a result of a meta-analysis combining data from nine studies covering individual, family, and group-based psychoeducation, it was reported that psychoeducation can improve caregiver burden, but further studies are needed (29).

Stigmatization is a common issue that families of people with bipolar disorder deal with (10). In our study, spouses of bipolar individuals were evaluated in terms of stigmatization after psychoeducation with a scale evaluating stigmatization in 3 dimensions (social withdrawal, concealment of illness, and

perceived worthlessness). Following the intervention, we noted a substantial reduction in stigma scale scores in our sample. A recent study evaluated the long-term effectiveness of psychoeducational family intervention (PFI) in bipolar I disorder at one and five years post-intervention. The study reported that psychoeducation reduced stigmatization and improved problem-solving skills in patients and their families (30). Another study compared the effectiveness of an online web-based peer-assisted self-management intervention (REACT) with a cognitive intervention for relatives of individuals with psychosis or bipolar disorder. The study reported that the stress levels of the patients' relatives decreased and their well-being increased during the follow-up period (24 w) (31).

Another difficulty that relatives of bipolar patients experience is being isolated from society and not getting enough social support, which is caused in part by their feelings or perception of stigmatization (14). In a study evaluating caregivers for loneliness, the participants reported living in isolation with an average of 1.7 people in their close networks and an average of 5.3 people in their entire networks (32). Similar findings were found in a study that examined the personal support networks of caregivers of patients with serious mental illnesses. The study reported that most of the participants lived in isolation due to "stigma" and had a small support network consisting mostly of close family members (33). In our study, spouses of bipolar patients were assessed on the "UCLA loneliness scale" before and after the intervention. Although the loneliness level scores of the bipolar patients' spouses decreased after psychoeducation intervention, there was no significant decrease. The findings of our study may be explained by the fact that some people experience loneliness even when they are not socially isolated (34). The results of the study, which show that Turkey has the highest levels of loneliness in Europe and emphasise the need for more extensive research on loneliness, support this view (35).

Relatives of bipolar patients are prone to depression, anxiety, and stress because they often live in isolation due to care burden and stigmatization (8). In the present study, DASS-21 was used to measure anxiety, depression and stress of spouses of bipolar patients before and after the psychoeducational intervention. The spouses of bipolar patients showed a significant decrease in their levels of depression and anxiety after the intervention. A study evaluating the effectiveness of a 7-session (2 hours each) psychoeducation program for caregivers reported a significant decrease in caregivers' depression (36). A study that only applied a group-based psychoeducation intervention for caregivers and used DASS-21 for the evaluation reported similar results (37).

Limitations should be taken into consideration when evaluating our research. The study involved caregivers who applied within specific dates, took place in a single center, had a restricted sample group (the majority of bipolar patients are divorced or alone), and had a brief follow-up period following the intervention.

CONCLUSION

Our study observed a significant decrease in the stigmatization, emotional expression, depression, and anxiety scores of the patients' spouses who participated in the intervention. However, although there was a decrease in the loneliness score, it was not significant. Our study results are similar to the literature reporting that psychoeducational intervention improves family members' knowledge about the disease, relieves their burden, and reduces their distress (38). Based on this result, it may be recommended to continue psychoeducation systematically in clinical practice.

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Ethics Committee Approval: Approval for this study was obtained from the Kırıkkale University Non-Interventional Research Ethics Committee (29/06/2022 tarih ve 2022.06.06).

We state that the parents have given their written informed consent to be involved in the study, in accordance with the Declaration of Helsinki.

Peer-review: Externally peer-reviewed

Author Contributions: Concept: HK, KA, Design: HK, KA, Data Collection and Processing: HK, Analysis and Interpretation: KA, Writing: HK, KA

Conflict of Interest: The authors declared no conflict of interest.

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Determination of Possible Biomarkers for Predicting Well-Differentiated Thyroid Cancer Recurrence by Different Ensemble Machine Learning Methods

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Abstract

Objective: Well-differentiated thyroid cancer (WDTC) is the most common thyroid malignancy and although it is curable, the risk of recurrence is high. In this study, classification algorithms based on clinicopathologic features of WDTC patients were used to determine the possible of recurrence in WDTC and to evaluate potential predictive factors, and possible biomarkers based on the optimal model were identified.

Method: In this study, open access data on 383 patients with WDTC, 108 with recurrence and 275 without recurrence, were used. In order to predict recurrence in WDTC patients, features were selected using recursive feature elimination variable selection method among features and classification was performed with two ensemble learning methods (Random Forest, Adaboost).

Results: Two different ensemble learning models used to classify recurrence in WDTC were Random Forest with an accuracy of 0.957, sensitivity of 0.889, specificity of 0.978, positive predictive value of 0.923, negative predictive value of 0.967, Matthews correlation coefficient of 0.878, G-mean of 0.945, F1-score of 0.906, and accuracy of 0.940, sensitivity of 0.889, specificity of 0.955, positive predictive value of 0.857, negative predictive value of 0.966, Matthews correlation coefficient of 0.833, G-mean of 0.910, F1-score of 0.873.

Conclusion: According to variable importance based on the Random Forest, the 5 possible clinical biomarkers for predicting WDTC recurrence are Response, Risk, Node, Tumor, and age. In the light of these findings, patient management and treatment planning can be organized.

Keyword: Well-Differentiated, Thyroid Cancer, Recurrence, Random Forest, Adaboost

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INTRODUCTION

Thyroid cancer is a type of cancer that starts in the thyroid gland and usually grows slowly. The thyroid gland is a gland located in the lower part of the neck, in front of the larynx. The function of the thyroid gland is to produce hormones that regulate metabolism. Symptoms of thyroid cancer are usually noticed in a person with a thyroid nodule. These symptoms may include a lump or mass in the neck, difficulty swallowing, hoarseness, difficulty breathing, and sometimes pain in the neck or ear (1). Thyroid cancer is a gender-neutral cancer that has increased in recent years with the widespread use of ultrasonography and US-guided fine needle biopsies, and according to GLOBOCAN 2023 data, it has a rate of 1% among all other cancers. Although thyroid cancer can be seen in any gender, approximately 75% of thyroid cancer patients are women and it is the seventh most common cancer type in women (2). Well-differentiated thyroid cancer represents an important subtype among thyroid cancers. This type of thyroid cancer usually refers to a condition called "well-differentiated", in which cells in the thyroid gland behave and grow in a similar way to normal thyroid cells. Well-differentiated thyroid cancers can be divided into subtypes such as papillary thyroid cancer and follicular thyroid cancer. Well-differentiated thyroid cancer is usually a slow-growing cancer and usually has a better prognosis than other types of thyroid cancer. If detected in the early stages and treated appropriately, cure rates are quite high. This type of cancer is usually treated with surgery. Surgery to remove the thyroid gland and surrounding tissues (thyroidectomy) is a common treatment method. In some cases, radioactive iodine therapy or hormone therapy may be required after surgery. Although this cancer tends to have a better prognosis than other types of thyroid cancer, regular follow-up after treatment is important because there is always a chance that the cancer may recur (3, 4).

Machine learning algorithms, which play a crucial role in disease classification, can help accurately identify and classify diseases by learning complex patterns and relationships from large amounts of data. Machine learning algorithms can classify/predict disease on new data using inputs such as a patient's symptoms, test results or imaging findings. Therefore, machine learning methods can predict which disease a patient has or which disease risk he/she is at with some results about patients. On the other hand, machine learning algorithms can help doctors diagnose diseases and create treatment plans. For example, deep learning algorithms can be used to detect cancer or identify disease symptoms using imaging techniques (e.g. MRI or CT scans) (5). By using ensemble learning methods, which are machine learning techniques that aim to create a stronger model by combining multiple learning

algorithms, and weak learners that usually work together, a stronger performance can be achieved when they come together, even though each of them does not have high performance on its own. Ensemble learning methods are often used to reduce overfitting, increase accuracy, and create more generalizable models (6, 7).

In this study, using an open-source dataset of well-differentiated thyroid cancer patients with different clinicopathologic features, different ensemble learning models (Adaboost, Random Forest) that can predict recurrence in these patients were created and risk factors that may be associated with well-differentiated thyroid cancer recurrence were identified according to the optimal model (Random Forest) result.

METHODS

Dataset and Data Preprocessing

The dataset used in the study is an open source dataset containing 13 different clinicopathological features of well-differentiated thyroid cancer patients and published at https://www.kaggle.com/datasets/joebeachcapital/differentiated-thyroid-cancer-recurrence (8). Ethical approval for this study was received from Inonu University Health Sciences Non-Interventional Clinical Research Ethics Committee (approval number: 2024/5931). Detailed information about the 13 features in the dataset is given in Table 1.

Table 1. Explanations about 13 different features used in the study

Features	Features Type
Age	Represents the age of individuals in the dataset.
Gender	Indicates the gender of individuals (e.g., Male or Female).
Smoking	Possibly an attribute related to smoking behavior. The specific values or categories would need further exploration.
Smoking History	Indicates whether individuals have a history of smoking
Radiotherapy History	Indicates whether individuals have a history of radiotherapy treatment
Thyroid Function	Possibly indicates the status or function of the thyroid gland
Physical Examination	Describes the results of a physical examination, likely related to the thyroid
Adenopathy	Indicates the presence and location of adenopathy (enlarged lymph nodes)
Types of Thyroid Cancer (Pathology)	Describes the types of thyroid cancer based on pathology examinations, including specific subtypes like "Micropapillary Papillary," "Follicular," and "Hürthle cell."
Focality	Indicates whether the thyroid cancer is unifocal or multifocal
Risk	Represents the risk category associated with thyroid cancer
Tumor	Represents the T (Tumor) stage of thyroid cancer, indicating the size and extent of the primary tumor.
Lymph Nodes	Represents the N (Node) stage of thyroid cancer, indicating the involvement of nearby lymph nodes.
Cancer Metastasis	Represents the M (Metastasis) stage of thyroid cancer, indicating whether the cancer has spread to distant organs
Stage	Represents the overall stage of thyroid cancer based on the combination of T, N, and M stages
Treatment Response	Describes the response to treatment, including categories such as “Indeterminate”, “Excellent”, “Structural Incomplete” and “Biochemical Incomplete”.
Recurred	Indicates whether thyroid cancer has recurred.

Data Collection

Variable selection, a fundamental step for building more effective and generalizable models, is critical to improve the performance of the machine learning model, prevent overfitting, reduce computational costs, increase understandability, and improve data preprocessing. In the current study, the recursive feature elimination (RFE) variable selection method was applied. In the RFE method, it determines the subset of predictions required for an accurate model by eliminating the predictors backwards according to their order of importance. Predictors are ranked in order of importance, and the least important ones are removed in order (9). As the last stage of data preprocessing, the holdout method, one of the simplest methods of cross-validation, was applied and the data set was randomly divided into 70% training set and 30% testing set. The Accuracy, Balanced accuracy, Sensitivity, Specificity, Positive predictive value, Negative predictive value, Matthews correlation coefficient (MCC), G-mean and F1-Score metrics in the performance evaluation of machine learning models. Formulas for performance metrics are given below.

Accuracy=(TP+TN)/(TP+TN+FP+FN)

Precision=TP/(TP+FP)

Recall=TP/(TP+FN)

Sensitivity=TP/(TP+FN)

Specificity=TN/(TN+FP)

Balanced accuracy= (Sensitivity+ Specificity)/2

Positive predictive value=TP/(TP+FP)

Negative predictive value=TN/(TN+FN)

Matthews correlation coefficient (MCC) = (TP*TN)-(FP*FN)/((TP+FP)*(TP+FN)*(TN+FP)*(TN+FN))1/2

G-mean= (Sensitivity* Specificity)1/2

F1-Score=(2*Precision*Recall)/(Precision+Recall)

Random Forest

Random Forest is an ensemble learning method and is a model created by combining multiple decision trees. Each decision tree is trained with randomly selected features and a random sample. Random Forest is widely used for classification and regression problems and generally provides high accuracy and generalization ability. It captures the variability and complexity in the data set well while reducing overfitting. It is similar to the bagging technique, but each tree is trained with random samples and features (10).

Adaboost

AdaBoost, first proposed by Freund and Schapire in 1997, is one of the most used boosting algorithms (11). AdaBoost algorithm, which is considered the first boosting algorithm, has solved many of the practical difficulties of previous boosting algorithms.

For this reason, it is preferred over other boosting methods due to its features such as high prediction speed, low memory usage, and easy applicability. The working steps of the AdaBoost algorithm are based on the logic of creating a weak classifier from each feature and obtaining an ensemble from these weak classifiers. The decision limits of weak classifiers are found by taking the weighted average of negative and positive examples for each feature. A new strong classifier is created with the help of weak classifiers with the lowest error rate. Thus, the features of weak classifiers that are not included in the strong classifier are deleted (12).

Statistical analysis

Quantitative variables in the dataset were summarized as mean±standard deviation and qualitative variables were summarized as number (percentage). Since the age variable did not meet the assumption of normal distribution according to recurrence categories, the difference between groups was examined with the Mann-Whitney U test. The relationship between categorical variables such as Gender, Smoking, Smoking History, Radiotherapy History and the recurrence of thyroid cancer was examined with Fisher Exact, Continuity Correction and Pearson Chi-Square tests, as appropriate. A value of $p<0.05$ was considered statistically significant. IBM SPSS 26.0 and "Adabag" package for the R programming language were used to perform the analyses (13,14).

RESULTS

Descriptive statistics for variables in the data set by thyroid cancer recurrence categories are presented in Table 2.

According to the results of Table 2, there is a statistically significant difference between the recurrence of thyroid cancer and all other variables in the data set, except for the variable indicating the status/function of the thyroid gland. After RFE variable selection was applied to all other data variables except thyroid cancer recurrence, which was the target variable in the modeling, 10 variables were included in the model. The metrics regarding the training and testing performances of machine learning classification models (Random Forest, Adaboost) created with these variables are given in Table 3.

Considering the data in Table 3, Random Forest is the machine learning algorithm that makes the best classification with all performance metrics. The performance metrics for classifying thyroid cancer recurrence with the Random Forest machine learning algorithm are 0.957, 0.933, 0.889, 0.978, 0.923, 0.967, 0.878, 0.945, 0.906 for Accuracy, Balanced accuracy, Sensitivity, Specificity, PPV, NPV, MCC, G-mean, F1-Score, respectively. The importance of variables that play a role in the recurrence of thyroid cancer through the Random Forest

algorithm is given in Figure 1. According to Random Forest machine learning, the five most important factors that play a role in the recurrence of thyroid cancer were found to be Response, Risk, Node, Tumor, and age.

Table 2. Descriptive statistics for variables in the data set by thyroid cancer recurrence categories

		Recurred		p-value
		No	Yes	
		Count	Count	
Gender	Female	246a (89.45%)	66b (61.11%)	**<0.001**
	Male	29a (10.55%)	42b (38.89%)	
Smoking	No	259a (94.18%)	75b (69.44%)	**<0.001**
	Yes	16a (5.82%)	33b (30.56%)	
Hx Smoking	No	261a (94.91%)	94b (87.04%)	**0.014**
	Yes	14a (5.09%)	14b (12.96%)	
Hx Radiothreapy	No	274a (99.64%)	102b (94.44%)	**0.002**
	Yes	1a (0.36%)	6b (5.56%)	
Thyroid Function	Clinical Hyperthyroidism	27a (9.82%)	5a (4.63%)	0.244
	Euthyroid	234a (85.09%)	98a (90.74%)	
	Subclinical Hyperthyroidism	14a (5.09%)	5a (4.63%)	
Physical Examination	Diffuse goiter	7a (2.55%)	0 (0.00%)	**0.011**
	Multinodular goiter	88a (32.00%)	52b (48.15%)	
	Normal	5a (1.82%)	2a (1.85%)	
	Single nodular goiter-left	63a (22.91%)	26a (24.07%)	
	Single nodular goiter-right	112a (40.73%)	28b (25.93%)	
Adenopathy	Bilateral	5a (1.82%)	27b (25.00%)	**<0.001**
	Extensive	0 (0.00%)	7a (6.48%)	
	Left	5a (1.82%)	12b (11.11%)	
	No	265a (96.36%)	62b (57.41%)	
Pathology	Follicular	16a (5.82%)	12a (11.11%)	**<0.001**
	Hurthel cell	14a (5.09%)	6a (5.56%)	
	Micropapillary	48a (17.45%)	0 (0.00%)	
	Papillary	197a (71.64%)	90b (83.33%)	
Focality	Multi-Focal	66a (24.00%)	70b (64.81%)	**<0.001**
	Uni-Focal	209a (76.00%)	38b (35.19%)	
Risk	High	0 (0.00%)	32a (29.63%)	**<0.001**
	Intermediate	38a (13.82%)	64b (59.26%)	
	Low	237a (86.18%)	12b (11.11%)	
Tumor	T1a	48a (17.45%)	1b (0.93%)	**<0.001**
	T1b	38a (13.82%)	5b (4.63%)	
	T2	131a (47.64%)	20b (18.52%)	
	T3a	55a (20.00%)	41b (37.96%)	
	T3b	2a (0.73%)	14b (12.96%)	
	T4a	1a (0.36%)	19b (17.59%)	
	T4b	0 (0.00%)	8a (7.41%)	
Node	N0	241a (87.64%)	27b (25.00%)	**<0.001**
	N1a	12a (4.36%)	10a (9.26%)	
	N1b	22a (8.00%)	71b (65.74%)	
Metastasis	M0	275 (100.00%)	90a (83.33%)	**<0.001**
	M1	0 (0.00%)	18a (16.67%)	
Stage	I	268a (97.45%)	65b (60.19%)	**<0.001**
	II	7a (2.55%)	25b (23.15%)	
	III	0 (0.00%)	4a (3.70%)	
	IVA	0 (0.00%)	3a (2.78%)	
	IVB	0 (0.00%)	11a (10.19%)	
Response	Biochemical Incomplete	12a (4.36%)	11b (10.19%)	**<0.001**
	Excellent	207a (75.27%)	1b (0.93%)	
	Indeterminate	54a (19.64%)	7b (6.48%)	
	Structural Incomplete	2a (0.73%)	89b (82.41%)	

Table 2. The performance metrics of Random Forest and Adaboost machine learning models with training and testing datasets

	Random Forest		Adaboost	
	Training	Testing	Training	Testing
	Value (95% CI)	Value (95% CI)	Value (95% CI)	Value (95% CI)
Accuracy	0.996(0.989-1.00)	0.957(0.920-0.994)	0.996(0.989-1.00)	0.940(0.896-0.983)
Balanced accuracy	0.994(0.984-1.00)	0.933(0.888-0.979)	0.997(0.991-1.00)	0.922(0.873-0.971)
Sensitivity	0.988(0.933-1.00)	0.889(0.708-0.976)	1.00(0.955-1.00)	0.889(0.708-0.976)
Specificity	1.00(0.98-1.00)	0.978(0.921-0.997)	0.995(0.97-1.00)	0.955(0.889-0.988)
PPV	1.00(0.955-1.00)	0.923(0.749-0.991)	0.988(0.934-1.00)	0.857(0.673-0.96)
NPV	0.995(0.971-1.00)	0.967(0.906-0.993)	1.00(0.98-1.00)	0.966(0.904-0.993)
MCC	0.991(0.98-1.00)	0.878(0.818-0.938)	0.991(0.98-1.00)	0.833(0.766-0.901)
G-mean	0.997(0.991-1.00)	0.945(0.903-0.986)	0.994(0.985-1.00)	0.91(0.858-0.962)
F1-Score	0.994(0.984-1.00)	0.906(0.852-0.959)	0.994(0.985-1.00)	0.873(0.812-0.933)

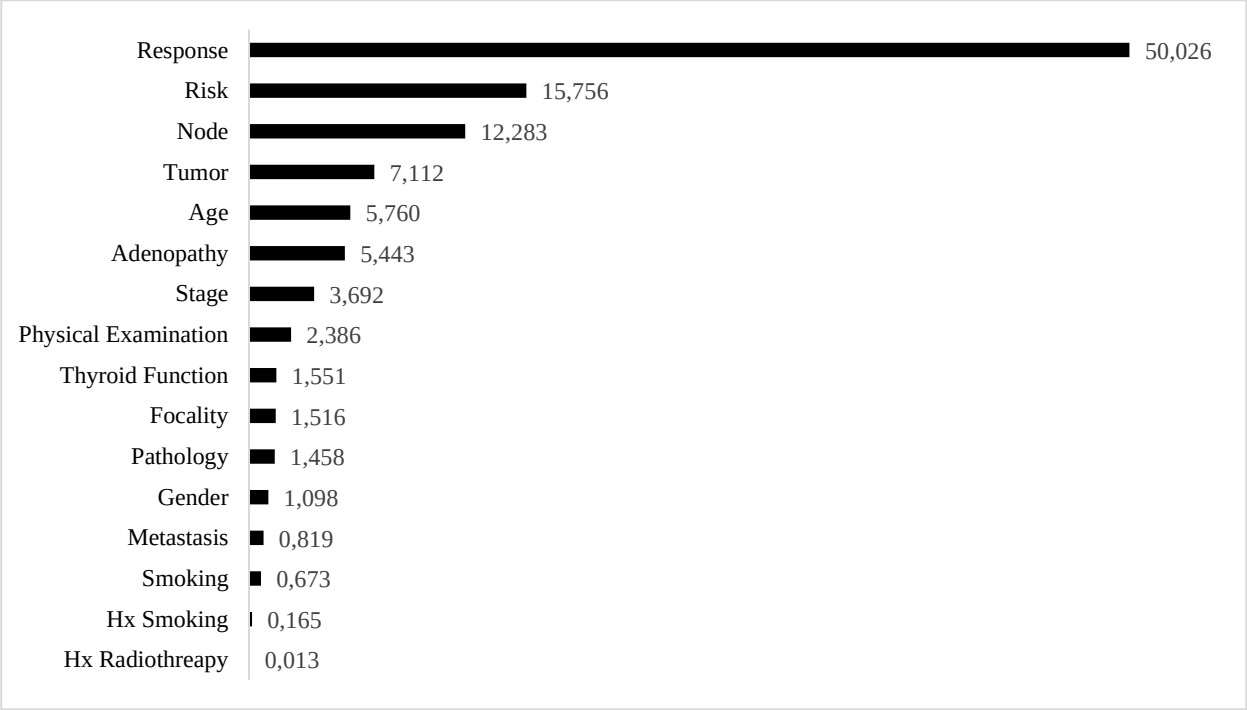

Figure 1. The importance of variables that play a role in the recurrence of thyroid cancer according to Random Forest machine learning

DISCUSSION

Thyroid cancer progresses with minimal symptoms that are difficult to diagnose. This may prevent patients from accessing early diagnosis and treatment and may lead to advanced stages. The primary treatment method for patients with well-differentiated thyroid carcinoma, which constitutes more than 90% of thyroid cancers, is surgery. Recurrent disease may present as a biochemical disease, nodal metastasis, residual disease, and distant metastasis without structural evidence (15,16).

When well-differentiated thyroid cancer is treated with surgery, successful results are usually achieved. However, the risk of relapse still exists. One reason for this is microscopic residues. The tumor may not have been completely removed during surgery or microscopic residues may have been left behind. These residues may grow over time, increasing the risk of recurrence. The another reason may be lymph node involvement. Well-differentiated thyroid cancer can sometimes spread to surrounding lymph nodes. These lymph nodes may not have been completely cleared during surgery, which may increase the risk of recurrence. The another is that the aggressiveness, size, and cellular characteristics of the tumor may affect the risk of recurrence. Especially large tumors and high-grade tumors have a higher risk of recurrence. The another reason is the response to post-treatment iodine therapy. Iodine therapy targets and can help destroy thyroid cancer cells. However, in some cases, cells may be resistant to this treatment and the risk of recurrence may increase. Therefore, there are many factors that create the risk of recurrence in this well-differentiated thyroid cancer. In this study, the recurrence risk was classified using different machine learning methods through data including pathological findings as well as clinical characteristics of well-differentiated thyroid cancer patients treated with surgery, and the most important risk factors were determined as a result of the optimal model according to the performance metrics obtained. The considering the performance ratings of two different (Random Forest, Adaboost) machine learning methods used in the study to classify well-differentiated thyroid cancer recurrence, the Random Forest algorithm is the best classifying model with 0.957, 0.933, 0.889, 0.978, 0.923, 0.967, 0.878, 0.945, 0.906 for accuracy, balanced accuracy, sensitivity, specificity, PPV, NPV, MCC, G-mean, F1-Score, respectively. These values reveal that the Random Forest model is highly successful in classifying well-differentiated thyroid cancer. In another study conducted with the same data set, thyroid cancer recurrence was classified using different machine learning models (17). In the study in question, SVM, K-nearest neighbors, Decision Tree, Random Forest and artificial neural networks algorithms were used for classification using the full data set. While the Random Forest algorithm has the highest sensitivity value (99.66%), the Decision Tree algorithm has the highest specificity value (100%). In another study using the same dataset, 23 different machine learning methods were used to classify well-differentiated thyroid cancer recurrence in two different scenarios, with and without feature selection (18). Random Forest machine learning method was one of the classification models created to predict thyroid cancer recurrence without using feature selection with 97% accuracy. In

addition, 10 different machine learning models created using feature selection were very successful in predicting thyroid cancer recurrence. In addition, 10 different machine learning models created using feature selection showed very successful performance such as 100% accuracy in predicting thyroid cancer recurrence. The findings obtained in the study regarding machine learning models in classifying thyroid cancer recurrence are in line with the aforementioned studies in the literature. However, unlike other studies, this study also presents possible clinical biomarkers that can be used to predict thyroid cancer recurrence. According to the variable significance scores obtained based on the optimal model, the five factors most likely to be associated with well-differentiated thyroid cancer recurrence are response, risk, node, tumor, and age.

CONCLUSION

In conclusion, the results suggest that recurrence of well-differentiated thyroid cancer may be associated with factors such as age, microscopic remnants after surgery, lymph node involvement, tumor aggressiveness and size, and response to iodine therapy. In this study, different machine learning methods were used to classify the risk of recurrence of well-differentiated thyroid cancer. The Random Forest algorithm, which is the best performing model, achieved high success in determining the risk of recurrence. Furthermore, similar results were obtained in other studies, and this study provides potential guidance on the prediction of thyroid cancer recurrence using clinical markers. These results may contribute to improving patient management and treatment planning (such as adjusting treatment intensity and determining appropriate follow-up intervals).

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Ethics Committee Approval: Approval for this study was obtained from the İnonu University Non-Interventional Research Ethics Committee (28/05/2024 tarih ve 2024/5931).

We state that the parents have given their written informed consent to be involved in the study, in accordance with the Declaration of Helsinki.

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Evaluation of YouTube as an Information Source for Use of Laser in Root Canal Treatment

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Abstract

Objective: At the present time patients in developed countries widely use online resources to access medical information. YouTube is a widely used website to get knowledge. In the past, medical and dental data were accessed only by doctor and dentist examinations. This research was aimed to assess the quality and quantity of the knowledge content in popular YouTube™ videos about laser root canal treatment (LRCT).

Method: Google Trends showed that "laser root canal treatment" was the most searched keyword on the topic. Included videos were assessed as the video's name, universal resource locators, the number of video display, time of adding in website, total numbers of likes, dislikes and comments and total video time. Each video was classed into the 3 groups according to their information source as dentist, commercial, dental clinic. This video was classified according to the quality of information content as ‘good’, ‘poor’, or ‘bad’. In the evaluation of the data, the distribution of variables was examined with the Shapiro-Wilk normality test, the intergroup comparison of variables that did not show a normal distribution was examined with the Kruskal Wallis test. Comparison of subgroups was examined with Dunn's multiple comparison test and comparison of qualitative data was analyzed with Chi-square test. The results were evaluated at the significance level of $p < 0.05$.

Results: Most of the YouTube™ videos on LRCT were uploaded by the dental clinic (44.0%). The advantage of LRCT was the most commonly covered topic (64.0%). No statistically significant difference was observed between the number of views, the number of comments, values of the bad, poor, and good situation groups. A statistically significant difference was observed between the number of likes of the bad, poor, and good situation groups ($p=0.048$). The liking values of the good group were found to be statistically significantly higher than the bad group ($p=0.034$).

Conclusion: YouTube™ is a social media platform where comprises subjective comments, and some videos that can be easily accessed can give wrong knowledge sometimes. The content is active; therefore, the search results change continually, because the areas of interest and video number of views vary over time. YouTube platform has a large quantity of social media data that is hard to analyze and uncontrollable.

Keyword: Laser; root canal treatment, social media, YouTube

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INTRODUCTION

Patients to usage online resources to reach medical knowledge is common with used internet in developed countries; but medical and dental data has been reached by only through examination with doctor and dentist in the past. It has been reported that one third of patients utility the internet as a source of medical information (1), with 11% of patients researching their symptoms before form the doctor's consultation (2). It is clear that 75% of people use the internet for medical information. However, it is important to note that the tendency to search the internet for this information varies by age, habit and place (3). It's clear from the numbers that a lot of people are looking for information on dental procedures (4), However, the analysis and documentation of internet-sourced information has been limited to medical disciplines (5). YouTube™ is the second most popular website in the world, beaten only by Google. It is the most commonly visited video site (6) by patients looking to access medical information because of users can easily accessible with computer , smartphone and television, an average user spends an average of 17 minute 42 second on YouTube™ a day (7). As is common on the internet, the uploaded videos is not expert-reviewed, can be uploaded from a lot of sources and is probably to be of variable quality. YouTube™ subscribers who by the use of 'search terms', can accessed videos, can use as an information source (8).

YouTube™ is becoming increasingly popular for learning about medical procedures. YouTube™ has been recognised by medical and dental professionals as a fund of data for patients, there are lots of studies researching the quality and quantity of data getable on this site (9).

Laser-activated irrigation is increasingly used in dental root canals as its effectiveness has been shown to be superior to conventional method (10). The laser method is based on laser-induced localized fluid vaporization and, after rapid bubble expansion and collapse, stimulation of microfluidic flow throughout the entire volume of the cavity (11). As a result of all these positive properties of the laser, it has become popular among dentists (12). Laser, a popular treatment; also attracted the attention of patients and prompted the laser to research. The

present study definitively assessed the quality and quantity of the knowledge content in popular YouTube™ videos about LRCT.

METHODS

Identification Criterias of YouTube Videos

Ethical approval is not required in this study, as research was conducted on the publicly accessible "http://www.youtube.com" using the google chrome web browser for data collection. We chose the 'laser root canal treatment' as our preferred option after searching for keywords on YouTube™ (https://www.youtube.com/) on 28 July 2020 between 8 am to 5 pm. Google Trends was the tool of choice for identifying the most commonly used search terms for LRCT. Sort by number of views" was used as the default filter for YouTubeTM searches. Previous searches and cookies and were removed. English language and acceptable sound and picture quality have been taken into account. The sample size was calculated using the G* Power software program (version 3.1.9.4; Axel Buchner, Universität Düsseldorf, Germany) and the total sample size required to identfy a moderate effect (0.60) with 80%power was found to be 19. In this study we included 50 YouTube™ videos.

Evaluation of You Tube Videos

We only included videos in this study that were in English, had acceptable visual and sound quality, and were not duplicates. The non-English language, lack of relevance to LRCT information, poor audio or visual quality, ironic videos and duplicates were all excluded from the selection process. Video's each characteristic was assessed as following;

- The video's name
- Universal Resource Locators (URLs)
- The number of video display
- Time of adding in website
- Total numbers of likes, dislikes, and comments
- Total video time

Each video was classed into the 3 groups according to their information source

- Dentist
- Commercial
- Dental clinic

One researcher (S.T.) evaluated the YouTube™ videos. Eight items with a total of 1 point were evaluated in videos (Table 1).

Table 1 The video information content

Scoring Items	Point
Describing	1
Material overview	1
Procedure of application	1
Advantages	1
Post-op experience	1
Educational	1
Commercial	1
Before-after	1
Total	8

Videos specified a total of 0–8 points; 0–2 points, which indicated bad video content with little information; 3–4 points, which indicated poor video content with useful information; 5–8 points, which indicated excellent and provided a great deal of valuable information. For each video; the number of views, the number of comments, likes and dislikes and video durations were recorded.

Statistical analysis

Statistical analyses were carried out on the data set applying the NCSS (Number Cruncher Statistical System) 2007 Statistical Software (Utah, USA) package program. The dissemination of variables was examined for descriptive statistical methods (mean, standard deviation, median, interquartile range) using the Shapiro-Wilk test for normality, the Kruskal-Wallis test to compare the variables between the groups, that did not have a normal distribution, Dunn's multiple comparison test for the comparison between subgroups, and for the comparison of qualitative data, the Chi-square test was performed. Our results were evaluated at $p<0.05$ significance level.

RESULTS

The descriptive statistics appraised of the 50 YouTube™ video demographics are submitted in Table 2.

The average total quantity of views of YouTube™ videos on LRCT was 1692.23 for dental clinic, 11518.56 for dentist and 6142.4 for commercial. The average quantity of comments was 5 for dental clinic, 5 for dentist and 1 for commercial. The total average quantity of 'likes' was 8.36 for dental clinic, 38.64 for dentist and 10.22 for commercial while the total average quantity of 'dislikes' was 1.78 for dental clinic, 9.6 for dentist and 4 for commercial. The majority of the videos were uploaded by dental clinics (44%), followed by dentists (36%), and the remaining videos were uploaded for commercial purposes. Significant difference was not observed in terms of the quantity of views, the quantity of comments, the quantity of likes, the quantity of dislikes, video duration and source status of the dental clinic, dentist and commercial resource groups.

Most YouTube™ videos about LRCT were uploaded by the dental clinic (44.0%). The benefits of LRCT were the most frequently discussed topic (64.0%), followed by an educational (62.0%), describing (48.0%), post-op experience and material overview (24.0%), and procedure of application (20.0%).

It is clear from the data that the difference between the descriptions is insignificant statistically ($p=0.647$), material overview ($p=0.688$), procedure of application ($p=0.204$), advantages ($p=0.661$), post-op experience ($p=0.508$), educations ($p=0.133$) and before-after ($p=0.149$) of the dental clinic, dentist, and commercial resource groups. Among the video demographics and description values, only a

significant difference was observed between the dental clinic, dentist and commercial groups in the commercial descriptive. No commercial description was observed in the dentist group (Table 3).

Table 2. Dental clinic, dentist and commercial information content statistics values

Source		Dental Clinic		Dentist		Commercial		P
The number of views	Ort±SS	1692.23±3814.32		11518.56±26046.64		6142.4±11543.58		0.245[α]
	Median (IQR)	300 (71.25-1498.25)		486.5 (97.75-13629)		2187.5 (208.75-5940.25)		
The number of comments	Closed comment	3	13.64%	4	22.22%	0	0.00%	0.316[β]
	No comment	14	63.64%	9	50.00%	9	90.00%	
	1-3	3	13.64%	1	5.56%	0	0.00%	
	>4	2	9.09%	4	22.22%	1	10.00%	
Like	Ort±SS	8.36±9.9		38.64±50.82		10.22±17.2		0.256[α]
	Median (IQR)	3 (1.75-12.75)		8 (2-70)		4 (1.5-10)		
Dislike	Ort±SS	1.78±0.67		9.6±9.32		4±4.24		0.258[α]
	Median (IQR)	2 (1-2)		7 (1.5-19)		2.5 (1-8.5)		
Video duration (sn)	Ort±SS	187.36±151.79		184.28±139.72		233.3±221.3		0.887[α]
	Median (IQR)	131 (65.75-303)		124.5 (85-242.25)		122 (67.75-446.5)		
Situation	Bad	13	59.09%	6	33.33%	5	50.00%	0.530[β]
	Poor	7	31.82%	8	44.44%	4	40.00%	
	Good	2	9.09%	4	22.22%	1	10.00%	

[α] Results of Kruskal-Wallis H test; [β] Results of Pearson chi-square test

Table 3. Dental clinic, dentist and commercial; Youtube video demographics and descriptive statistics values

		Dental Clinic		Dentist		Commercial		
		n:	%:	n:	%:	n:	%	P
Describing	No	13	59.09%	8	44.44%	5	50.00%	0.647[α]
	Yes	9	40.91%	10	55.56%	5	50.00%	
Material overview	No	18	81.82%	13	72.22%	7	70.00%	0.688[α]
	Yes	4	18.18%	5	27.78%	3	30.00%	
Procedure of application	No	19	86.36%	15	83.33%	6	60.00%	0.204[α]
	Yes	3	13.64%	3	16.67%	4	40.00%	
Advantages	No	9	40.91%	5	27.78%	4	40.00%	0.661[α]
	Yes	13	59.09%	13	72.22%	6	60.00%	
Post-op experience	No	18	81.82%	12	66.67%	8	80.00%	0.508
	Yes	4	18.18%	6	33.33%	2	20.00%	
Educational	No	9	40.91%	4	22.22%	6	60.00%	0.133[α]
	Yes	13	59.09%	14	77.78%	4	40.00%	
Commercial	No	20	90.91%	18	100.00%	6	60.00%	**0.007**[α]
	Yes	2	9.09%	0	0.00%	4	40.00%	
Before-After	No	22	100.00%	15	83.33%	9	90.00%	0.149[α]
	Yes	0	0.00%	3	16.67%	1	10.00%	
Total Score	Mean (SD)	2,18±1,56		2,94±1,89		2,9±1,97		0.294[β]
	Median (IQR)	2 (1-3)		3 (1-4,25)		2,5 (1,75-4)		

[α] Results of Pearson chi-square test; [β] Results of Kruskal-Wallis H test

It is clear from the data that the difference between the descriptions is insignificant statistically: the quantitiy of views (p=0.214), the quantitiy of comments (p=0.788) values of

the bad, poor, and good situation groups. We can state with confidence that there was a statistically significant difference between the quantitiy of likes of the bad, poor, and good situation groups (p=0.048). The results clearly show a statistically significant difference between the values of the following parameters: dislike quantity of the bad, poor, and good situation groups (p = 0.026) (Table 4).

The good group scored significantly higher than the bad group on the liking scale (p=0.034). The other two groups on the liking scale were not found to be statistically significant. The dislike scores of the good group were found to be statistically significantly higher than bad and poor groups scores (p=0.008, p=0.049), and the results were not statistically significant between the bad and poor groups (p=0.556). The video duration values of the good group were found to be statistically significantly higher than those of the bad group (p=0.001), and between the other groups, no statistically significant difference was observed (p>0.05) (Table 5).

Table 4. Bad, poor and good information content statistics values

Situation		Bad		Poor		Good		P
The number of views	**Mean (SD)**	3050.79±7796.35		8713.11±25076.47		9602.71±11820.28		0.214 α
	Median (IQR)	300 (63.75-1546)		365 (103-5383)		4884 (463-16731)		
The number of comments	**No comment**	16	66.67%	12	63.16%	4	57.14%	0.788 β
	Closed comment	2	8.33%	3	15.79%	2	28.57%	
	1-3	3	12.50%	1	5.26%	0	0.00%	
	>4	3	12.50%	3	15.79%	1	14.29%	
Like	**Mean (SD)**	9.63±16.64		13.9±16.9		62.4±65.35		**0.048** α
	Median (IQR)	2 (1-11)		7 (3.5-19)		62 (4.5-120.5)		
Dislike	**Ort±SS**	1.8±0.92		3.4±3.78		15±8		**0.026** α
	Median (IQR)	2 (1-2)		2 (1-6.5)		15 (7-23)		
Video duration (sn)	**Mean (SD)**	131.79±112.47		227.26±195.12		327.29±100.1		**0.003** α
	Median (IQR)	92.5 (59.5-181.75)		122 (95-352)		330 (230-409)		
Source	**Dental Clinic**	13	54.17%	7	36.84%	2	28.57%	0.530β
	Dentist	6	25.00%	8	42.11%	4	57.14%	
	Commercial	5	20.83%	4	21.05%	1	14.29%	

α Results of Kruskal-Wallis H test; β Results of Pearson chi-square test

Table 5. Dunn's multiple comparison test

	Like	Dislike	Video duration (sn)
Bad / Poor	0.138	0.556	0.061
Bad / Good	**0.034**	**0.008**	**0.001**
Poor / Good	0.159	**0.049**	0.078

It is clear that statistically significant differences exist between the describing and material overview of the bad, poor, and good situation groups (p=0.0001). The presence of describing and material comparison in the bad group was lower than the poor and good groups. A statistically significant difference was obtained the before-after and procedure of

application of between the bad, poor, and good situation groups (p=0.0001, p=0.001). The presence of before-after and procedure of application, in the good group was higher than in the poor and bad groups. It is statistically clear that there is a difference in the distribution of educational and advantage between the groups in each situation (p=0.0001, p=0.001). It has been definitively proven that those in the "bad" group have significantly lower levels of education and advantages than those in the "poor" and "good" groups. The post-op experience and commercial presence distributions of the bad, poor, and good situation groups showed statistically insignificant difference (p<0.05) (Table 6).

Table 6. Bad, poor and good; Youtube video demographics and descriptive statistics values

		Bad		Poor		Good		P
Describing	**No**	22	91.67%	4	21.05%	0	0.00%	**0.0001**[α]
	Yes	2	8.33%	15	78.95%	7	100.00%	
Material overview	**No**	23	95.83%	15	78.95%	0	0.00%	**0.0001** [α]
	Yes	1	4.17%	4	21.05%	7	100.00%	
Procedure of application	**No**	21	87.50%	17	89.47%	2	28.57%	**0.001** [α]
	Yes	3	12.50%	2	10.53%	5	71.43%	
Advantages	**No**	15	62.50%	2	10.53%	1	14.29%	**0.001** [α]
	Yes	9	37.50%	17	89.47%	6	85.71%	
Post-op experience	**No**	20	83.33%	13	68.42%	5	71.43%	0.501 [α]
	Yes	4	16.67%	6	31.58%	2	28.57%	
Educational	**No**	17	70.83%	2	10.53%	0	0.00%	**0.0001** [α]
	Yes	7	29.17%	17	89.47%	7	100.00%	
Commercial	**No**	23	95.83%	15	78.95%	6	85.71%	0.234 [α]
	Yes	1	4.17%	4	21.05%	1	14.29%	
Before-After	**No**	24	100.00%	19	100.00%	3	42.86%	**0.0001** [α]
	Yes	0	0,00%	0	0,00%	4	57,14%	
Total Score	**Mean (SD)**	1,08±0,83		3,42±0,51		5,57±0,79		**0,0001** [β]
	Median (IQR)	1 (0-2)		3 (3-4)		5 (5-6)		

[α] Results of Pearson chi-square test; [β] Results of Kruskal-Wallis H test

DISCUSSION

At the present, patients are more and more turning to search engine like Google and video-sharing web sites like YouTube to informed in healthcare (13). Delli at al. (8) reported the quality of this information is unverifiable and not useful in some cases. Despite this, Nason et al (14) found that 33 % of people believed that the health information on the most popular websites was accurate. A few topics connected to oral health and dentistry have been appraised on YouTube™ such as orthognathic surgery, early childhood caries and root canal treatment (15–17). This is the first study to analyze the content and quality of YouTube™ videos info about LRCT.

The internet and social media have become more prevalent in recent years, making

YouTube™ the first port of call for LRCT patients seeking advice. Prior studies have shown that videos on YouTube™ were not an adequate source of information, and therefore clinicians should suggest videos that provide accurate information (16,18,19).

Lena and Dindaroglu (20) reported that the videos with a high knowledge had a long videos in their study. Our study also found that the longest videos were in the 'good-information content' category. Good-information content videos are commonly uploaded by dentist while bad content videos are uploaded by dental clinic in our study. It was clear that videos uploaded by dentists included more information, which explains why they were longer. The data clearly shows that the longest videos and the most viewed and liked videos were in the 'good-information content' category. Our analysis revealed that the viewers' comment index was mostly in the bad-information content than good-information content. Therefore this may be because the less of information makes the situation open to interpretation.

In this study, videos usually had bad and poor-information quality, and ranking was not based on the informational content of the videos. This proves that the YouTube™ relevance rank is not an accurate reflection of the content of the videos. The majority of the videos have flimsy, limited information, which improves the risk of spreading. misinformation and may have a negative impact on patients' attitudes towards LRCT. Nason et al. (17) appraised YouTube™ videos about root canal in their research and they confidently declared that the majority of videos on YouTube™ had low information content. As a result, they firmly proposed that the site is not a suitable resource for information.

Nason et al. (17) appraised YouTube videos on root canal were researched and found to have low information content, YouTube is not an accurate source of information for this topic. On the other hand, Wong et al. (21) studies found the quality of the content to be high on Botox injections videos. YouTube is a useful resource for patients seeking information about this procedure, all the same, some of the uploaded YouTube videos for commercial may create source with incorrect and insufficient information.

CONCLUSION

YouTube™ is a social media platform where comprises subjective comments, and some videos that can be easily accessed can give wrong knowledge sometimes. The content is active; therefore, the search results change continually. The number of views varies over time, so it is not possible to make a reliable comparison between areas of interest and video views. YouTube manufacture a large quantity of social media data that is hard to analyze and uncontrollable. However, it should not be forgotten that YouTube™ variables can absolutely be manipulated. The clinicians must

take a more proactive approach and ensure that patients are directed to the most suitable platforms for accurate information.

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Are the Websites of the Dentistry Faculties in Turkey Adequate for Informing Pediatric Patients?

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Abstract

Objective: This study aimed to evaluate the quality and readability of information provided by the websites of the Department of Pedodontics in the Dentistry Faculties of State Universities (SU) and Foundation Based Universities (FBU) in Turkey for pediatric patients.

Method: All dentistry faculties in Turkey were identified through the Council of Higher Education database and classified as public and FBU. The websites of the faculties were accessed via the Google search engine, and the information pages of the Department of Pediatric Dentistry prepared for the patients were evaluated according to the Quality Criteria for Consumer Health Information (DISCERN), Journal of American Medical Association (JAMA), and Atesman Readability Formula.

Results: No significant differences were observed among universities in terms of DISCERN scores ($p>0.05$), except in Section 1 ($p=0.041$). In Section 1, SU demonstrated higher DISCERN scores than FBU. None of the Faculties of Dentistry had an 'excellent' score. However, no significant differences were identified between universities in relation to Atesman scores ($p>0.05$), and no significant differences were found between universities on the JAMA benchmark scale ($p>0.05$).

Conclusion: Within the limitations of this study, it was determined that the quality and readability of information on websites prepared by the Faculty of Dentistry in Turkey for parents of pediatric patients are low. It is recommended that information on university websites, which are official institutions that closely follow scientific developments and are preferred by parents of patients for information purposes, should be checked with appropriate evaluation tools in terms of quality and readability.

Keyword: Dentistry Faculties Websites, Information, Quality, Readability

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INTRODUCTION

With the widespread use of the Internet, the approach to health services and the resources used has changed (1). The Internet has become one of the most common and important sources of health information (2,3).

Millions of people worldwide use the Internet daily to obtain information in the health field (4). More than 80% of Internet searches are available for medical support and information (5). According to the results of an information technology usage survey in Turkey, 94.1% of houses have the opportunity to access the Internet from home (6). According to data from the Turkish Statistical Institute, Internet use was reported to be 85% in the 16-74 age group in 2020 (6). This makes the Internet a valuable source of information in the health field (4).

Most Internet users believe that Internet-based information is of high quality and reliable (2). Patients believe that the information they receive from the Internet is equal to or better than the information provided by health professionals (7). While patients' level of knowledge in the field of dentistry increases with internet use, the potential for inaccurate or misinterpreted information remains problematic (8).

It is important to provide quality information resources that meet people's demands for information and to guide them in this regard (9). It has been reported that individuals' trust in official institutions is higher than that of other institutions for promotional and advertising purposes (10).

In the literature review, no scientific research was conducted on university websites to inform parents of pediatric patients. This study aimed to evaluate the quality and readability of information provided by the websites of the Department of Pedodontics at the Faculty of Dentistry of SU and FBU in Turkey.

METHODS

Search Strategy

All dentistry faculties in Turkey were identified through the Council of Higher Education database and classified as SU or FBU (11). The websites of the faculties were accessed from the Google search engine, and the information pages of the Department of Pediatric Dentistry prepared for the parents of the patients were evaluated. The websites included in the study were evaluated by a pediatric dentist according to the Quality Criteria for Consumer Health Information (DISCERN), the Journal of American Medical Association (JAMA), and the Atesman readability formula. To check for intra-rater agreement, 20% of the websites included in the study were randomly selected and re-examined after three weeks. Atesman readability formula scores were calculated automatically by uploading information texts to an online application (http://okunilirlikindeksi.com/).

Quality Criteria for Consumer Health Information (DISCERN)

It was the first standardized quality index of consumer health information developed by Charnock et al. (12), and was used to evaluate the quality of written information on treatment options.

The DISCERN quality criteria included a questionnaire consisting of three parts and 16 questions. The first part (questions 1-8) was prepared to determine the reliability of the website, the second part (questions 9-15) was prepared to evaluate the quality of the information about treatment options, and the third part (question 16) was prepared to evaluate the overall quality of the website.11 Each question was scored from 1 to 5, according to the Likert scale. According to the DISCERN quality criteria, websites with a score of 16-26 are considered 'very poor,' 27-38 'poor,' 39-50 'moderate,' 51-62 'very good,' and higher than 63 'excellent'(12).

Journal of American Medical Association (JAMA)

The JAMA criteria were used to evaluate the standards of information obtained from written health information sources by Silberg et al. (13), including Authorship (authors, contributors, links, and credentials), Attribution (references and sources of content and copyright information), Disclosure (potential conflicts of interest, advertising, sponsorship, and insurance), and Currency (content published and updated dates), which are the four main features that must be clearly observed on a website. Each website was examined individually, and each item meeting these criteria was scored 1. While the lowest score obtained from the evaluation of the JAMA criteria was 0, the highest was 4.

Atesman Readability Formula

This is the first study to classify the readability level of Turkish texts. The coefficients in Flesch's formula were adapted to Turkish using the average word and sentence lengths of each text (14). In the Atesman formula, the readability of texts is measured based on the variables of average word and sentence lengths in the texts. In the Atesman formula, the readability of texts is scored out of 100; the higher the text score, the higher the readability of the text. If the readability score of the information on the websites is between 90-100, it is classified as 'very easy,' 70-89 as 'easy,' 50-69 as 'moderate,' 30-49 as 'difficult,' and less than 29 'very difficult' (14).

Statistical Analysis

Statistical analysis was performed using Jamovi software version 2.3.26. Normality was tested using the Shapiro-Wilk test. The data had a non-normal distribution and ordinal variables; therefore, the Mann-Whitney U test was used to compare university websites based on DISCERN and Atesman scores. In addition, the

Fisher-Exact Test was used for categorical variables in the JAMA benchmark scale. Spearman's correlation analysis was used to compare scales. Correlation coefficients with an absolute value lower than 0.40 were considered low, between 0.40 and 0.60, moderate; and above 0.60, high strength (15). Intra-rater agreement was assessed using Cohen's kappa coefficient. The data are summarized as median (min-max) or N(%). The level of significance was set at P <0.05.

RESULTS

A total of 102 Dentistry Faculty websites were evaluated. Seventy-three websites belonged to SU and twenty-nine belonged to FBU. Data entry was not made on the websites of 26 (25.4%) SU, 17 (16.7%) FBU, and 43 (42.1%) in total. Therefore, excluding these websites, it was planned to work on the websites of the Faculty of Dentistry of 47 SU (79.6%) and 12 FBU (20.4%), 59 websites in total.

Among the SU, there were 9 (19.1%) in the Central Anatolia Region, 8 (17%) in the Aegean Region, 7 (14.8%) in the Marmara, Mediterranean, and Black Sea Regions, 5 (10%) in the Southeastern Anatolia Region, and 4 (8.5%) in the Eastern Anatolia Region. SU and FBU have been actively serving in patient care and education for an average of 18.4 years and 9.5 years, respectively. Kappa analysis revealed a high level of intra-observer agreement for DISCERN (k = 0.877) and JAMA (k = 0.853).

Table 1. Comparison of DISCERN and Atesman scores among the groups

	State Universities	**Foundation Based Universities**	**Total**	***p* value**
DISCERN Scores	24 (11-26)	21 (15-26)	21 (11-26)	0.875†
Section 1	13 (7-31)	11 (7-24)	12 (7-31)	**0.041**†
Section 2	36 (18-57)	32 (22-50)	35 (18-57)	0.336†
Total	2 (1-4)	1.5 (1-3)	2 (1-4)	0.061†
Atesman Score	31 (0.5-79.9)	43 (0.8-68.5)	32.8 (0.5-79.9)	0.516†

Quality Criteria for Consumer Health Information (DISCERN), Median (Min-Max), †Mann-Whitney U test

Based on our findings, no significant differences were observed among universities in terms of DISCERN scores (p>0.05), except in Section 1 (p<0.05). In Section 1, SU demonstrated higher DISCERN scores than FBU did. None of the dentistry faculties had an 'excellent' score (Table 1). The DISCERN scores of the university websites are shown in Figure 1. However, no significant differences were identified between universities regarding Atesman scores (p>0.05). The Atesman scores of the SU and FBU are shown in Figure 2.

While all faculty websites provided Disclosure criteria, none of them provided Attribution criteria. No significant differences were found between the universities regarding the JAMA

benchmark scale (p>0.05) (Table 2). The JAMA benchmark scores for the university websites are shown in Figure 3. No significant correlation was found between the scales (p>0.05) (Figure 4).

Table 2. Comparison of JAMA benchmark scores among the universities

	State Universities (N:47)	**Foundation Based Universities (N:12)**	**Total (N:59)**	***p* value**
Authorship[1]				0.519[†]
No	35 (74.5%)	10 (83.3%)	45 (76.3%)	
Yes	12 (25.5%)	2 (16.7%)	14 (23.7%)	
Attribution[1]				NC
No	47 (100.0%)	12 (100.0%)	59 (100.0%)	
Yes	0 (0%)	0 (0%)	0 (0%)	
Disclosure[1]				NC
No	0 (0%)	0 (0%)	0 (0%)	
Yes	47 (100.0%)	12 (100.0%)	59 (100.0%)	
Currency[1]				0.124[†]
No	39 (83.0%)	12 (100.0%)	51 (86.4%)	
Yes	8 (17.0%)	0 (0.0%)	8 (13.6%)	
Total Quality Score	1 (1-3)	1 (1-2)	1 (1-3)	0.154[††]

[1]n (%), [2]Median (min-max), NC: Not calculated. [†] Fisher-Exact Test [††] Mann-Whitney U test

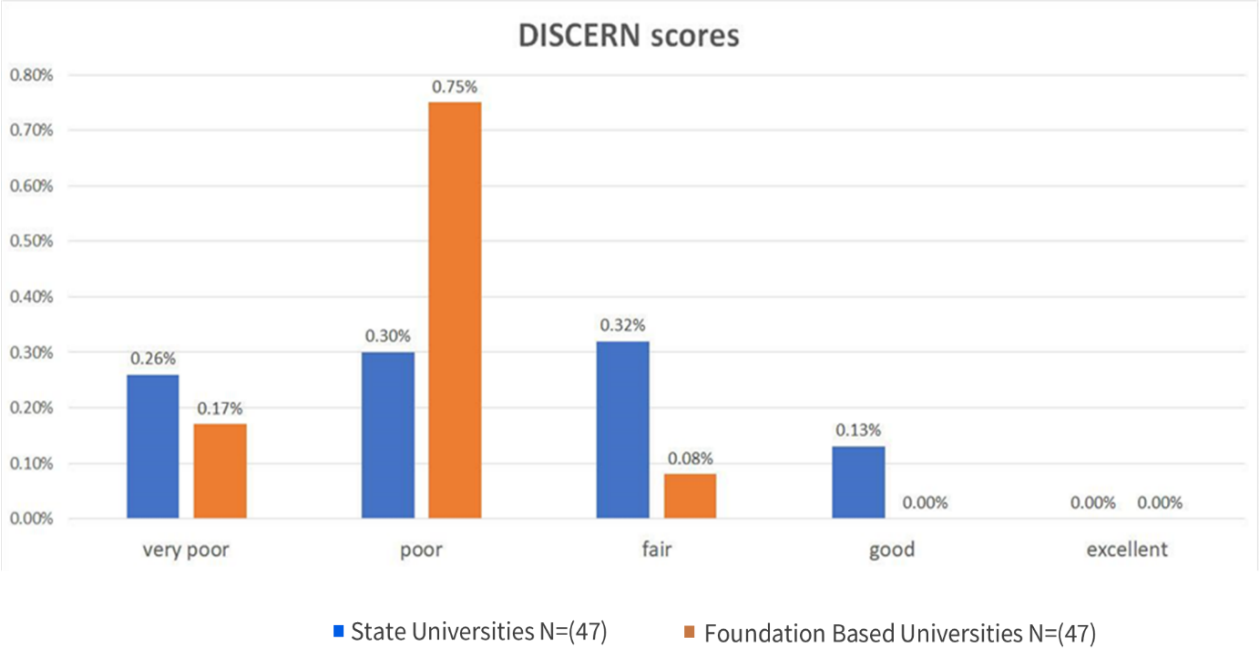

Figure 1. DISCERN Quality Index Scores of The University Websites (%)

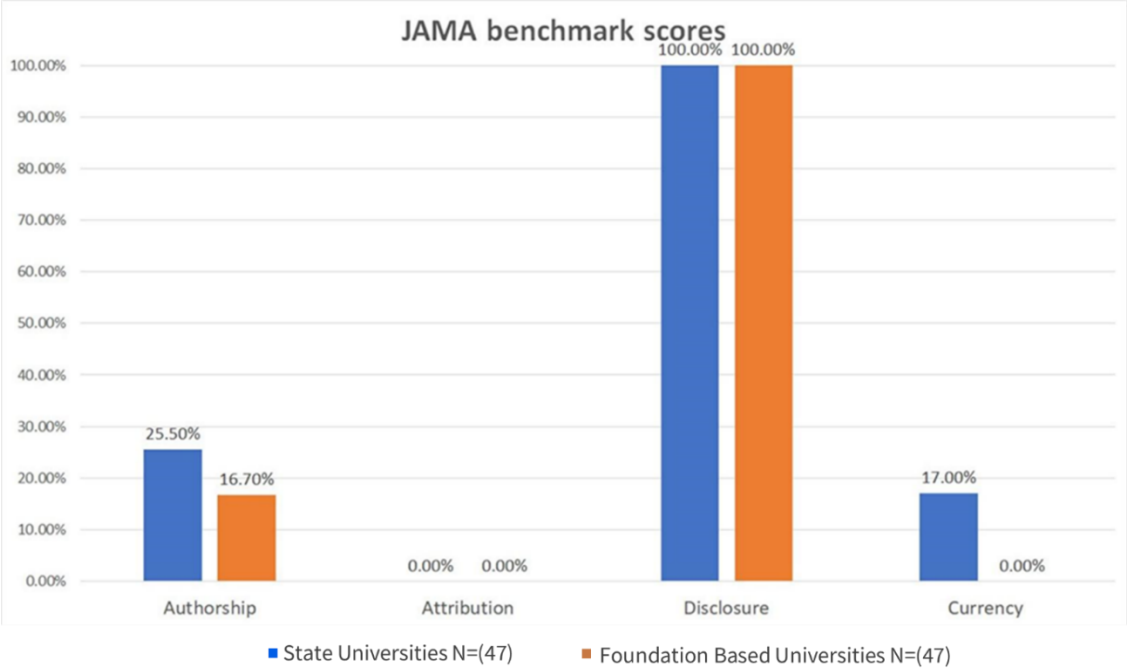

Figure 2. JAMA Benchmark Scores of The University Websites (%)

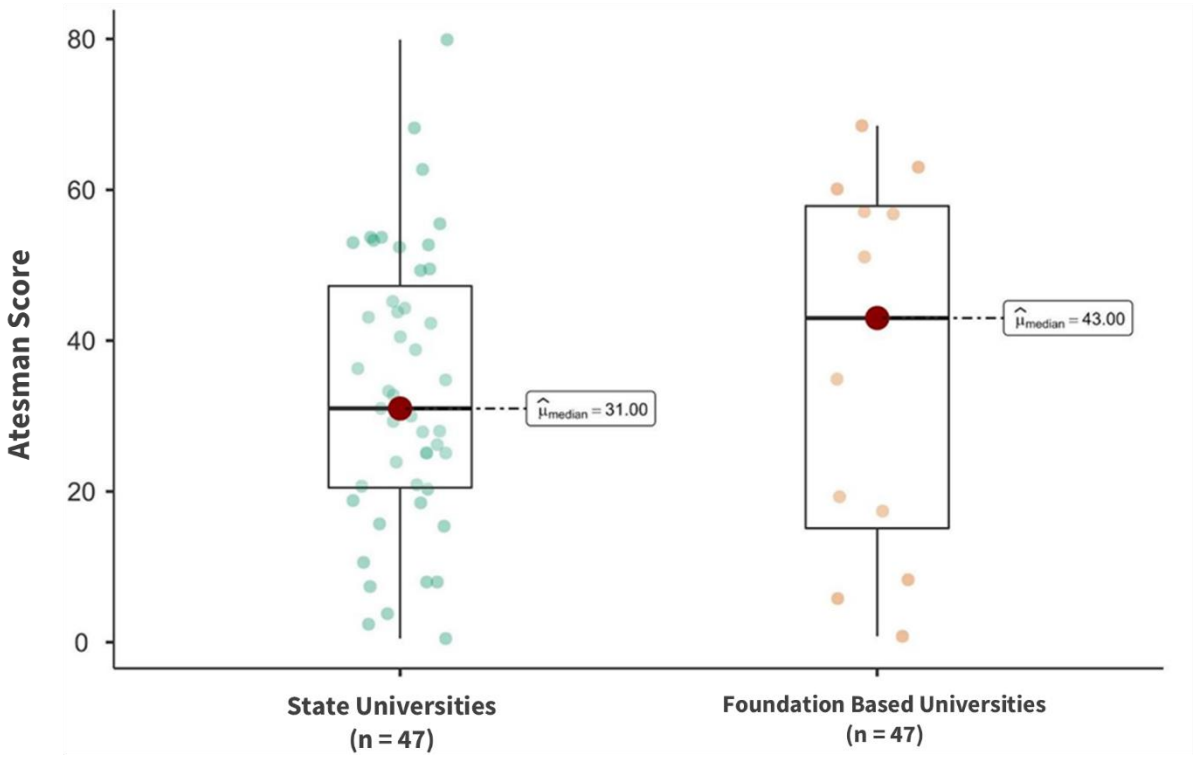

Figure 3. Atesman readability formula scores of the State and Foundation Based Universities

DISCUSSION

The internet has become the primary source of information that patients commonly use to obtain information about health (1). It is difficult for patients seeking treatment to distinguish between Internet resources that

provide quality and reliable information and those that provide low-quality information (16). For this reason, it is very important to have resources where patients can obtain accurate information through the Internet.

Despite the increasing amount of data on the Internet, there have been no studies on the websites of universities, which are official institutions where the level of trust of patients' parents is high. This study is the first to evaluate the quality and readability of information on the websites of the Faculty of Dentistry, Pediatric Dentistry Department.

To minimize the possible disadvantages of using the Internet for informational purposes, many tools have been developed to objectively evaluate the quality, reliability, and justification of online information. The DISCERN quality index and JAMA criteria are among the tools currently accepted for validity and reliability (16-18).

An important aspect of evaluating Internet information quality is whether a text is linguistically intelligible (19). Numerous tools have been developed to assess the readability of text (14,20). The Atesman Readability Formula is the first study to classify the readability levels of Turkish texts and adapt the coefficients in Flesh's formula to Turkish. The use of multiple assessment tools increased the quality of the study and allowed for a more comprehensive assessment. Therefore, in the current study, three different evaluation methods (DISCERN Quality Index, JAMA criteria, and Atesman Readability Formula) were used to evaluate the websites of dental faculties.

In the present study, Atesman scores for SU and FBU were 43 and 31, respectively. These scores indicate that the readability of websites is 'difficult'. Online information on university websites for informational purposes for pediatric dentistry patients is far beyond the recommended reading level. These data show that healthcare professionals should share content in a manner that minimizes the number of medical terms consisting of short and clear words and sentences in articles prepared for parents of patients.

Although SU scored significantly higher for Section 1 in the DISCERN Quality Index, the overall quality of information for all sites was found to be 'very poor'. The low scores on the 'reliability' of websites were due to the websites' lack of objectivity, additional sources of information, and insufficient information regarding publication dates. In a study conducted by Aghasiyev and Yilmaz(10), in which Internet information resources were evaluated in general, it was stated that the reliability and quality of information were not sufficient and that state resources, which are institutional structures, could contribute to obtaining more reliable resources with a coordinated program.

When the JAMA criteria were examined, the least provided was for the 'Attribution'

criterion. 'Authority' and 'Relevance' criteria remained at low levels in the scoring. When all criteria are evaluated, the lack of authors, reference sources, and the date on which the information was edited and updated are noteworthy regarding the information provided. In this study, most university websites did not have an author, date of writing, or update of the current content. As stated in Olkun and Demirkaya's study(21), in which they evaluated Internet information sources, the dates on which information was uploaded and updated should be clearly stated, particularly when preparing websites in the field of health. The sharing of date information by health professionals while preparing university websites plays an important role in terms of quality and up-to-date information. It is thought that this situation is of even greater importance and needs to be improved since the relevant websites belong to universities where education is given, and the current research follows. Information shared online without specifying the source causes uncertainty regarding the reliability of university websites. Therefore, health professionals should consider the sources of written material on websites.

The present study had some limitations. The results obtained from the websites in the short term are presented. Internet platforms have dynamic and constantly renewed features and websites are updated with a constant change in information.

CONCLUSION

Within the limitations of this study, it was determined that the quality and readability of information on websites prepared by the Faculty of Dentistry in Turkey for pediatric parents of patients was low. It is recommended that information on university websites, which are official institutions that closely follow scientific developments and are preferred by parents of patients for information purposes, should be checked with appropriate evaluation tools in terms of quality and readability. Considering that there are a significant number of dental faculties in Turkey and that the need for treatment of pediatric teeth is high today, it is important for the parents of patients to obtain accurate and high-quality information

Ethics Committee Approval: Since the study was conducted using online data, ethics committee approval is not required.

Peer-review: Externally peer-reviewed

Author Contributions: Concept: SEA, Design: İO, Data Collection and Processing: SEA, İO Analysis and Interpretation: SEA, Writing: SEA, İO

Conflict of Interest: The authors declared no conflict of interest.

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CASE REPORT
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Case Report: Management of Penile Fracture with Urethral Injury in Two Patients

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Abstract

Penile fracture is a trauma accompanied by sudden pain, swelling, loss of erection, deviation, and ecchymosis along with a breaking sound in the penis. It can be accompanied by urethral injuries in 11-22% of patients, occurring due to force/blunt trauma to the erect penis. In this case report, we present two cases of penile fracture with accompanying urethral injury, occurring approximately one month apart. In our first case, surgical repair was performed approximately 1 hour after the incident, and in the second case, it was performed approximately 2 hours after the incident. Ultrasound (USG) was used as radiological imaging in both cases. In the second case, suspicion of urethral injury was mentioned in the USG. In both cases, a subcoronal circumferential incision was made, and the penile skin was degloved up to the radix. Damaged areas in the intraoperative tunica albuginea and urethra were observed in both cases. Postoperatively, the penile bandage of the first case was removed on the 4th day, and that of the second case was removed on the 6th day. The catheter was removed on the 20th day in both cases. In both cases, no loss of erection or penile deviation was observed at the 3-month postoperative follow-up. No clinical or uroflowmetric findings compatible with urethral stenosis were found in the 2nd and 3rd months post-op. The current approach to penile fractures is emergency surgical decompression and repair.

Keyword: Penile Fracture, Urethra Rupture, Trauma

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INTRODUCTION

Penile fracture is an uncommon urological trauma. It is defined as the rupture of the tunica albuginea surrounding the corpus cavernosum after blunt trauma to the erect penis. The most common causes are sexual intercourse, forced

flexion, masturbation and rolling over with 46%, 21%, 18% and 8.2% respectively (3). The usual mechanism of injury is the penis slipping out of the vagina and striking the symphysis pubis or perineum. Patients usually hear a cracking sound when the penis is bent, and then come to the hospital with sudden loss of erection, angulation of the penis, pain, swelling and ecchymosis. While the fracture mostly occurs in the tunica albuginea surrounding a single corpus cavernosum, there are cases in which both corpus cavernosums are affected. In some cases, injuries involving the dorsal nerve of the penis, vessels and urethra may occur. Urethral injury accompanying penile fracture is not a common condition and has been reported in 11-22% of cases (2). In cases where the urethra is affected, urination problems may accompany the clinical picture. Among the imaging methods, penile Doppler USG (ultrasonography), pelvic MRI (magnetic resonance imaging) and retrograde urethrography can be performed to evaluate the urethra. MRI may also be helpful in the diagnosis of urethral rupture (4). The recommendation of European and American Urology guidelines for the standard treatment of penile fracture is early surgical intervention (5).

CASE 1

A 31-year-old male patient was admitted to the emergency department with complaints of pain, swelling, discoloration, deformity, and urethral bleeding in the penis accompanied by a sudden loss of erection during sexual intercourse. The patient reported that the incident occurred half an hour prior to presentation. In the physical examination, a hematoma on the dorsal side of the penis, pain on palpation, and ventral deviation of the penis were detected. Penile fracture was considered in the patient. The patient underwent emergency penile superficial USG. A dense collection area (hematoma?) extending to the urethra lumen, measuring 17 mm in its thickest part and extending proximally, was observed on the right lateral wall of the corpus spongiosum in the distal part of the penis, and there was an appearance that might be compatible with a defect on the right lateral wall of the corpus spongiosum. The echogenicity of the corpus spongiosum had increased. The vascular blood supply of the corpus cavernosum was natural. In the right cavernosum, there was irregularity in the lateral wall and an iso-hypoechoic heterogeneous appearance that might be compatible with hematoma. The situation was explained to the patient, and he was taken for emergency surgical repair.

Following spinal anesthesia, a 14 F silicone catheter was inserted in the supine position under sterile conditions and urine output was observed. Afterwards, an incision was made at the penis circumcision line and it was opened with sharp and blunt dissections all around, down to Buck's fascia. An approximately 2 cm

opening was seen in the midline of the penis at the edge of the right corpus cavernosum, and it was seen that there was a hematoma inside, which was cleaned as shown in Fig. 1. It was observed that the tear line was advancing towards the urethra. The urethra and cavernosa were separated from each other. The torn urethral section was repaired with 4.0 Vicryl. Afterwards, the cavernous body was repaired with 3.0 Vicryl as shown in Fig. 2. It was closed by combining it with the upper fascia. Then, the skin was closed with 4.0 rapid. The procedure was completed by applying appropriate dressing and wrapping it with a printed bandage. The patient's postoperative period was uncomplicated, the penile bandage was removed on the 4th day, and he was discharged. The patient's catheter was removed on the 25th postoperative day. Qmax: 27 post-void residual (PVR): 70 cc. No erection problems were detected at the 3-month follow-up, and the patient did not describe any symptoms suggestive of urethral stenosis. Diagnostic urethroscopy was performed on the patient, who complained of thinning during urination at the 4th-month follow-up, and no urethral stricture was detected.

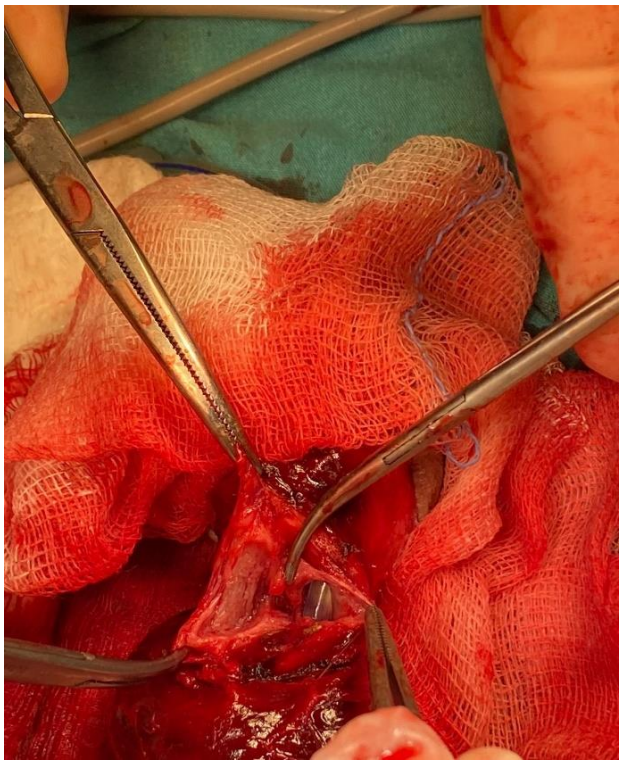

Figure 1. Penile surgical exploration showing defect in the corpus cavernosum and urethra

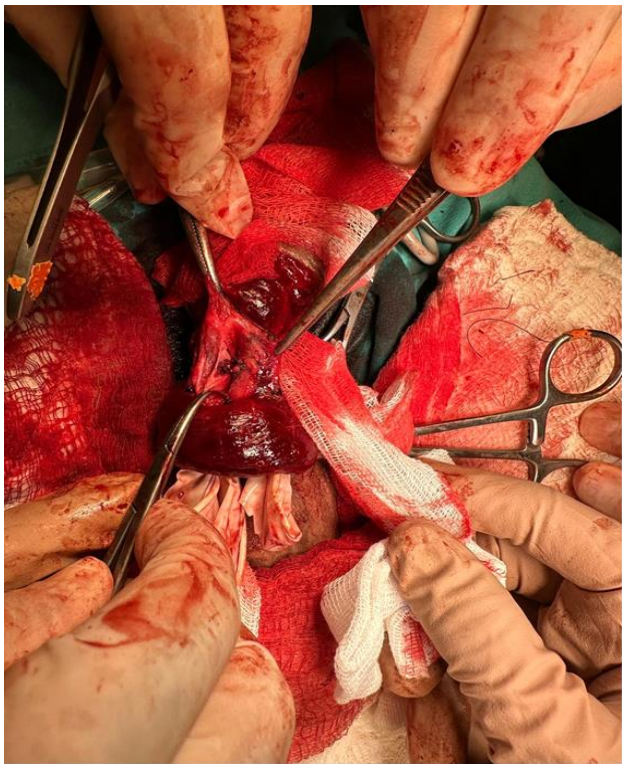

Figure 2. Picture of cavernose body and urethra after sutured

CASE 2

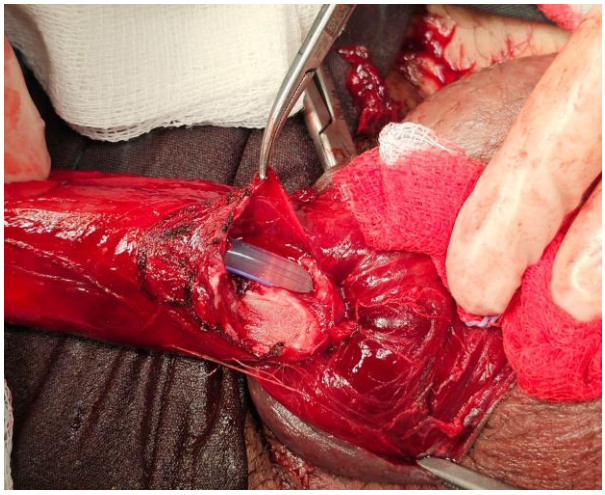

Figure 3. A defect of corpus cavernosum and urethra

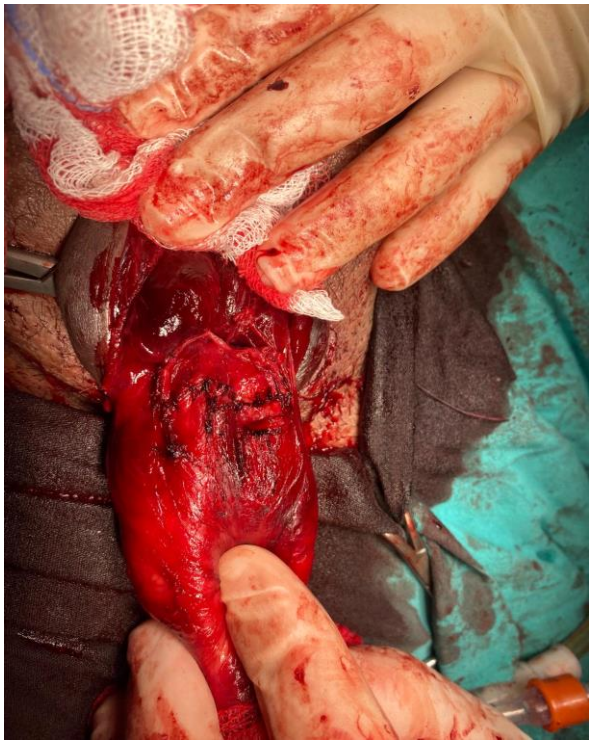

Figure 4. Sutured corpus cavernosum and urethra

A 35-year-old male patient was admitted to the emergency department with complaints of pain, swelling, discoloration, deformity, and urethral bleeding in the penis accompanied by a sudden loss of erection during sexual intercourse. The patient reported that the incident occurred two hours prior to presentation. In the physical examination, a hematoma on the dorsal side of the penis, pain on palpation, and ventral deviation of the penis were detected. Penile fracture was considered in the patient. The patient underwent urgent penile superficial USG. In the superficial USG performed on the penis, no significant defect was observed in the corpus cavernosum structures, and a blood supply signal was obtained on RDUS examination. Approximately 1 cm distal from the penis dorsum, a heterogeneous hypoechoic area of approximately 40x17 mm in size surrounding the corpus spongiosum, which is primarily considered as a hematoma area, was observed and was suspicious for urethral injury. The current situation was explained to the patient, and he was taken into emergency surgery for repair.

Following spinal anesthesia, a 16 F silicone catheter was inserted in the supine position under sterile conditions and urine output was observed. Afterwards, an incision was made at the penis circumcision line and it was opened with sharp and blunt dissections all around, down to Buck's fascia. An approximately 2 cm opening was seen on the ventral surface of the middle/root part of the penis at the edge of the right corpus cavernosum, and it was seen that there was a hematoma inside as shown in Fig. 3, which was cleared. It was observed that the tear line was advancing towards the urethra. The urethra and cavernosa were separated from each other. The torn urethral section was

repaired with 4.0 Vicryl. Then the cavernous body was repaired with 3.0 Vicryl (Fig. 4). It was closed by combining it with the upper fascia. The skin was then closed with 4.0 rapid. The procedure was completed with appropriate dressing. The patient's postoperative period was uncomplicated, the penile bandage was removed on the 6th day, and he was discharged. The patient's catheter was removed on the 20th postoperative day. No erection problems were detected at the 3-month follow-up. The patient did not describe any symptoms that would suggest urethral stenosis. In the 2-month post-operative uroflowmetry performed on the patient, Qmax: 26, Postvoidal residual urine (PVR): 0, and in the 3-month control uroflowmetry, Qmax: 27, PVR: 50 cc.

DISCUSSION

In our first case, surgical repair was performed approximately 1 hour after the incident, and in the second case, it was performed approximately 2 hours after the incident. USG was used as radiological imaging in both cases. In the second case, suspicion of urethral injury was mentioned in the USG. In both cases, the penile skin was degloved up to the radix with a subcoronal circumferential incision made on the penis. In both cases, intraoperative tunica albuginea and damaged areas in the urethra were observed. Postoperatively, the penile bandage of the first case was removed on the 4th day, and that of the second case was removed on the 6th day. In both cases, the catheter was removed on the 20th day. In both cases, no loss of erection or penile deviation was observed at the 3-month postoperative follow-up. No clinical or uroflowmetric findings compatible with urethral stenosis were observed in the 2nd and 3rd postoperative months. The current approach to penile fractures is emergency surgical decompression and repair.

Penile fracture occurs as a result of the rupture of the corpus cavernosum, which has increased pressure when the erect penis is forced and exposed to blunt trauma. Penile fracture is associated with a sudden cracking or popping sound, pain, and sudden swelling. Local swelling of the penile shaft develops rapidly due to the expansion of the hematoma. If Buck's fascia is also torn, bleeding can spread through the fascial layers of the penile shaft and extend into the lower abdominal wall. Sometimes the tear of the tunica can be felt by hand. Less severe penile injuries can be distinguished from penile fractures because they are not usually associated with detumescence. During erection, the tunica albuginea thins from 2 mm to 0.25-0.5 mm, which creates an environment predisposing to penile fracture, that is, making the penis more vulnerable to traumatic damage. In order for the tunica albuginea to rupture, the pressure inside it must exceed 1500 mmHg (5). During sexual intercourse, the erect penis hitting the symphysis pubis or perineum, getting stuck between it, or manipulations to

create detumescence in the erect penis play a role in the etiology of penile fracture (6). It is reported in the literature that the most common cause of penile fracture is trauma during position change during sexual intercourse (33-60%). Other reasons include sudden movements during nocturnal erection, falling out of bed, and masturbation. McEleny et al. claim that the incidence of penile fracture increases in positions where the female partner is on top during sexual intercourse. The largest series in the literature belongs to Atar et al., which includes three hundred patients. The diagnosis and treatment methods are similar to our cases. Classic findings include a breaking sound in the penis, sudden onset of pain, instant loss of erection, swelling, ecchymosis, and deviation in the penis. McEleny et al. defined this appearance of the penis as "eggplant deformity" or "aubergine sign" (6). The hematoma is usually limited to the penis by Buck's fascia. If Buck's fascia is also perforated, the hematoma may progress to the scrotum and perineum. In 10-30% of cases, there are additional injuries to the corpus spongiosum and urethra. Microscopic hematuria, while a warning sign of urethral injury, has a positive predictive value of only 50%. In these cases, urinary extravasation, inability to urinate, and in delayed cases, urethral stenosis may occur. Penile fracture is typically diagnosed through a careful history and physical examination. In suspicious cases, cavernosography, classical and/or color Doppler ultrasonography, magnetic resonance imaging, angiography, and in cases with suspicion of urethral trauma, urethrography examinations may be performed. Penile ultrasonography and magnetic resonance imaging methods have limited success in diagnosis (1-3). Although the treatment of penile fracture cases is debated, the standard treatment is emergency surgery. In surgical treatment, the hematoma is evacuated, the torn tunica albuginea is repaired, and the surgery is terminated after bleeding control. Early surgical repair in the treatment of penile fracture has significant advantages compared to conservative treatment, due to its low morbidity, good functional results, and short hospital stay, and is the recommended method of treatment. Two of our cases underwent emergency surgery and were discharged without complications in the early postoperative period. With early surgical repair, complications such as penile curvature, fibrotic plaque formation, and painful erection are largely prevented, sexual function is preserved, and hospital stay is reduced. Late complications after conservative treatment include fibrosis and angulation in 35% and impotence in up to 62% (7). Early surgical intervention results in significantly less erectile dysfunction than conservative intervention. There were fewer patients developing plaques/nodules in those undergoing early surgery than conservative management. Those conservatively managed

were more likely to develop penile curvature as opposed to those surgically managed. Pooled analysis of 14 studies (511 participants) demonstrates significantly fewer complications with immediate surgery (1). The patient should be evaluated in the emergency department and urology consultation should be requested with an indication for urgent surgery to prevent complications that may arise due to delay. Patients in this diagnosis group may have difficulty applying to the emergency department because they are embarrassed, which may cause delays in their treatment. It would be appropriate for emergency physicians to empathize, respect the feelings of shame and privacy of patients who apply with these complaints, and examine them in an isolated environment.

CONCLUSION

Penile fracture is a urological emergency that occurs as a result of direct trauma to the erect penis and/or strain during sexual intercourse. It is appropriate to quickly evaluate these patients in the emergency department and request consultation from the urology service for emergency surgery. The use of advanced diagnostic methods for diagnosis is not cost-effective, and its use is not recommended except in suspicious cases and the presence of urethral rupture.

Ethics Committee Approval: The presented study is qualitative and consent was obtained by giving information about the study by one-toone interviews with the subjects who agreed to participate. The study was carried out by paying attention to the Declaration of Helsinki.

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