

Parasomnia and Dissociative Disorders

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Abstract

Objective: Parasomnias are Sleep Disorders characterized by abnormal behavioral and physiological events. Dissociative experiences that occur in dissociative Disorders can emerge at night and may be the cause of parasomnia. The aim of this study is to compare the Sleep characteristics of parasomnia patients with and without dissociative disorder in order to investigate whether dissociative experiences may continue while aSleep and to what extent they change parasomnia.

Method: Of patients who were evaluated after admission to the Center of Sleep Disorders (n: 2217) and polysomnography patients (n: 822), the study was conducted with 36 patients diagnosed with parasomnia according to the International Classification of Sleep Disorder-2 diagnostic criteria. To patients diagnosed with parasomnia were evaluated with psychometric tests such as Dissociative Experiences Scale, Childhood Trauma Questionnaire, Pittsburg Sleep Quality Index, Iowa Sleep Experiences Survey, Hamilton Depression Rating Scale, Beck Depression Inventory, and Structured Clinical Interview for Dissociative Disorders. The patient group with parasomnia and dissociative disorder was called group I, and the patient group with parasomnia alone was called group II.

Results: Dissociative disorder was detected in 41.6% of patients with parasomnia. The difference in psychometric test scores between Group I and Group II was statistically significant. In polysomnographic examination, all subjects in Group I and Group II were superficial with Sleep delta wave.

Conclusion: Dissociative experiences and childhood trauma are more common in people with Parasomnia conditions. Patients with Parasomnia and Dissociative Disorder are more depressed, according to both the clinician's and their own views on the subject. Delta slow wave bursts are similar in both groups.

Keywords: Parasomnia; Dissociative Disorders; Depressive Disorders; Polysomnography; Childhood trauma

Abbreviations: PSG: Polysomnography, ST: Sleep Terror, SW: Sleepwalking, EEG: Electroencephalography, NREM: Non Rapid Eye Movement, CNS: Central Nervous System, SA: Sleep Activity, SL: Sleep Onset Latency, SP: Sleep Period, χ^2 : Chi-Square Test, Z: Mann-Whitney U Test International Classification of Sleep Disorder-2: ICSD-2, American Academy of Sleep Medicine: AASM, Motility: EMG Activity during Arousal Reaction, AHI + PLMI: Apnea Hypnoea Index + Periodic Leg Movement Index, NNW: Number of Nighttime Wakefulness, Min. O2: Minimum O2, SPT: Sleep Period Time, AI: Arousal Index, WASO: Wakeup After Sleep Onset, PWP: Peak Wave Period, SD: Standard Deviation

Introduction

Parasomnias are Sleep Disorders characterized by abnormal behavioral and physiological events that occur in various phases of Sleep. As a general rule, parasomnia can be seen upon any event that causes Sleep fragmentation, or in individuals with a predisposition to increased slow wave. Parasomnias are frequent in the general population, more than 30% of people have experienced at least one type of parasomnia during a period in their lives [1]. Although parasomnia is frequently seen during childhood, it subsides in the adulthood. Reduced N3 phase Sleep and Central Nervous System (CNS) maturation with age can be the reason behind the decreased parasomnia incidence in adulthood [1-3]. Although there are limited number of studies, parasomnia in the adulthood is mostly related to psychiatric diseases and medical conditions [2]. Studies on defining the correlation between psychiatric disorder and parasomnia in

adulthood are insufficient. In most of the patients with parasomnia, bipolar Disorders, especially non-psychotic depressive disorder, and anxiety Disorders were reported [4]. Dissociative disorder is frequently observed alongside depressive Disorders [5]. In some individuals with dissociative amnesia, depressive symptoms can be seen together with self-harm, aggressive impulses, suicidal impulses and actions [6].

Reports on the fact that experiences grouped under the subject of post-traumatic arousal also continue during Sleep have brought a different perspective to the parasomnia studies. Reports on the facts that chronically recurring traumas since childhood are correlated with dissociative disorder [7] and people exposed to traumatic events are more dissociated than those who were not [8] have suggested that dissociative experiences of parasomnia patients that occur during daytime can also emerge at nighttime [9,10]. Heterogeneity in parasomnia etiology and the overlap between dissociative Disorders and parasomnias at the symptom level have caused the researchers to study the similarities between these diseases and whether or not there are separate diseases or different subtypes of the same disease. There are only a few studies on the correlation between parasomnia and dissociative Disorders.

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The goal of the study is to find the correlation between parasomnia and dissociative Disorder. Specific objectives include:

- 1) Determine whether stressor factors such as childhood traumas have an impact on parasomnia and if they manifest as behavioral symptoms in parasomnia,
- 2) Investigate the frequency of depressive mood in parasomnia and/or dissociative disorder patients,
- 3) If Sleep walking (SW) and Sleep terror (ST) are the answers to the thoughts in trauma-related deep wave Sleep, determine if parasomnia can be regarded as a variant of a dissociative process,
- 4) Identify if there is a correlation between overall Sleep quality, dissociative Disorders and parasomnia,
- 5) Study if parasomnia and dissociative disorder have common characteristics since similar arousal waves are observed in electroencephalography (EEG) of patients with parasomnia and patients who scored high in dissociative disorder.

Materials and Methods

Sample group

Target population of the study comprised patients admitted to Istanbul Erenköy Psychiatry and Research Hospital Center of Sleep Disorders between 11.10.2010-01.03.2012. Of patients admitted to the Center due to Sleep Disorders (n: 2217), patients with isolated symptoms such as respiratory problems in Sleep, hypersomnias, parasomnia, circadian rhythm Disorders, Sleep-related motility Disorders, teeth grinding, muscle cramps, were evaluated. Of admitted patients, those diagnosed with parasomnia based on International Classification of Sleep Disorder-2 (ICSD-2) diagnostic criteria and who showed potentially aggressive behaviour towards the patients and others, those with severe social and familial problems, those who have Sleepiness and behavioural difficulties during the daytime, those suspected of having episodes or those whose Sleep Disorders cannot be properly diagnosed with the existing symptoms and meet the exclusion criteria (n: 822) were selected and polysomnographic examination was performed. Of the patients who underwent Polysomnography (n: 822), those diagnosed with Parasomnia (n: 36) based on clinical ICSD-2 diagnostic criteria and polysomnography examination were evaluated for whether or not they have dissociative disorder according to Structured Clinical Interview for Dissociative Disorders.

Exclusion criteria: Those younger than 18 years of age, having mental retardation, dementia, delirium and other amnesic disorder that can be detected through medical evaluation, with alcohol and drug addiction/abuse based on anamnesis, using psychotropic and mood stabilizer medication that affect the Sleep pattern, having bodily faults or growth retardation such that it affects polysomnography evaluation were not included in the study.

This study commenced upon obtaining permission from Istanbul Erenköy Psychiatry and Research Hospital, Education Planning Committee (no: 33, 11.10.2010) in Turkey.

Data collection tool

A total of 36 patients who volunteered to participate in the study were informed about and included in the study. Informed consent forms were collected with signatures.

The patient group with parasomnia and dissociative disorder

was called group I, and the patient group with parasomnia alone was called group II.

The clinician applied Structured Clinical Interview for Dissociative Disorders and Hamilton Depression Rating Scale to all patients. The scales Dissociative Experiences Scale, Iowa Sleep Experiences Survey, Pittsburg Sleep Quality Index, Childhood Trauma Questionnaire and Beck Depression Inventory were completed by all patients.

Structured Clinical Interview for Dissociative Disorders (SCID-D): SCID-D is a semistructured diagnostic interview for the assessment of dissociative Disorders according to the DSM-IV criteria. Instrument developed in 1984-1985 by an Associate Research Scientist in the Department of Psychiatry at Yale University. Marlein Steinberg received a grant that allowed for 3 years of testing. SCID-D has 8 sections of interview that psychiatric history, amnesia, depersonalization, derealization, identity confusion, identity alteration, associated features of identity confusion, follow-up on identity confusion and identity alteration. SCID-D is scored and interpreted in a concise and easy method using a severity scale of the five dissociative symptoms. Interview begins with client's symptomatology, behaviours and intra-interviewing behaviours of dissociative Disorders. Interviewer transition is open – ended questions. The test uses a scale (1-4) to determine mild, moderate or severe symptomatology of each dissociative disorder symptoms. Each of the five symptoms has a severity scale of 4 and maximum score is 20. Validity is good to excellent in regard to the five dissociative symptoms and also dissociative Disorders. Test-retest reliability indicates excellent reliability with respect to the 5 Dissociative Disorders. The Turkish version of the scale has a reliability and validity and was studied by Sar et al. [11,12].

Dissociative Experiences Scale (DES)

DES was developed by Bernstein and Putnam in 1986. The overall DES score is obtained by adding up the 28 item scores and dividing by 28: this yields an overall score ranging from 0 to 100. It has been demonstrated that the scale differentiates patients with a chronic dissociative disorder and those with other psychiatric Disorders [13]. Patients who have DES average total score is 30 and up probably have dissociative Disorders in Turkish sample studies. The Turkish version of the scale was studied by Yargic and et al. has a reliability and validity [14]. The test-retest coefficient was calculated at close to 0.78 [13,14].

Hamilton Depression Rating Scale (HDRS)

The HDRS is a standard scale based on psychiatrists' assessments, and was developed in the late 1950s to measure depressive symptoms. The scale was initially designed to obtain a total score based on 17 of its 21 items. The 17 item version of the scale was modified by Max Hamilton. It has been used widely in research for initial and follow-up assessments of depressive symptoms. The scale was initially composed of open-ended questions directed to the patient by the evaluator. Afterward, the scale was modified to include standard questions for each item. Eight items are scored on a 5-point scale, ranging from 0=not present to 4=severe. Nine are scored from 0-2. Sum the scores from the first 17 items. 0-7=Normal 8-13=Mild Depression 14-18=Moderate Depression 19-22=Severe depression ≥ 23 =Very Severe Depression. The Turkish version of the HDRS has sufficient internal consistency; split-half, test-retest, and inter-rater reliability; structural and similar scales validity; and was shown to be valid and reliable in the assessment of clinical depression. The test-retest coefficient was calculated at close to 0.85 [15].

Beck Depression Inventory (BDI)

Aeron T Beck originally developed BDI in 1961. In 1996 Beck developed a second version of the inventory. BDI has 21 items standard personality multiple choice questionnaire test. BDI is a self reported analysis of depressive symptoms. It scored by summing the highest rating for each of the 21 item. Each item is then rated on a 4- point scale, ranging from 0 to 3, and the total score range from 0 to 63. The score ranging from 0 to 13 represent “minimal” depression; total score ranging from 14 to 19 represent “mild” depression while total scores from 20-28 are “moderate” and total scores from 29-63 are “severe”. The Turkish version of the BDI has sufficient reliability and validity studied by Hisli [15,16].

Childhood Trauma Questionnaire (CTQ)-28

The CTQ-28 was developed as a screening tool for histories of abuse and neglect. The self-report includes a 28-item test that measures 5 types of maltreatment – emotional, physical, and sexual abuse, and emotional and physical neglect. Reliability for the CTQ is good with high internal consistency scores. Sexual Abuse, Emotional Neglect, Emotional Abuse, Physical Abuse have reported coefficients of 0.93-0.95, 0.88-0.92, 0.84-0.89, and 0.81-.086, respectively. Over a 3 ½ month period, the test-retest coefficient was calculated at close to 0.80. Factor analysis tests on the five-factor CTQ model showed structural invariance which demonstrate good validity. There cannot calculate cut off value about Turkish version. The Turkish researchers are evaluated CTQ-28 score as 5 points and up for sexual and physical abuse, 7 points and up for physical and emotional neglect according to their studies. The Turkish version of the CTQ is reliable and valid as its original form [17].

The Pittsburgh Sleep Quality Index (PSQI)

PSQI was developed by Dr. Daniel J. Buysse and coworkers at the University of Pittsburgh's Western Psychiatric Institute and Clinic in the late 1980s. The questionnaire has eighteen individual items which are used to generate seven composite scores. The results give numbers in seven categories: subjective Sleep quality, Sleep latency, Sleep duration, habitual Sleep efficiency, Sleep disturbances, use of Sleeping medication, and daytime dysfunction. Each component is scored between 0-3. Total score is between 0-21 that big values from 5 indicate poor Sleep quality, while small values from 5 indicate good Sleep quality. The Turkish version of PSQI was studied by Agargun and et al. in 1996 that has sufficient reliability and validity. The test-retest coefficient was calculated at close to 0.93[18].

Iowa Sleep Experiences Survey (ISES)

ISES was developed by Watson in 1999. In 2001 Watson described last formation of the survey. ISES determines various Sleep and dreamlike experiences frequency. ISES provides likert type measurement. Survey is divided 2 section: General Sleep Experiences (GSE) and Lucid Dreaming (LD). The average of the points is obtained between all items. There is no validity or reliability in Turkish version. It is translated to Turkish. Total score of ISES is Cronbach alpha 0.87, 0.86 for GSE, and 0.83 for LR [19].

Polysomnography (PSG)

In polysomnographic examination, 6-channel EEG, 2-channel electrooculography, chin electromyography, oro-nasal air flow with nasal cannula, arterial oxygen saturation, respiratory effort with thoracoabdominal bands, and electrocardiography recordings were performed according to the international 10-20 mounting system of electrodes placed C4-A1, C3-O1-O2-A2, A1, A2, F4-A1, F3-A2. PSG were scored with RemLogic program. RemLogic is a full-feature

software package that contains file management, collection and review services. Offers manual and automatic scoring opportunities. Scoring and reporting is done as specified by the American Academy of Sleep Medicine (AASM) rules. N7000 device used in multidirectional data collection is an extensive PSG amplifier with 32 channel application feature.

Analysis of polysomnographic recordings

The computer-aided evaluation of all parameters was checked manually (30 s epochs for Sleep staging). The following Sleep scoring data were included: Sleep period time (SPT), defined as time of Sleep onset to the end of Sleep, including all Sleep epochs and wakefulness after Sleep onset; wakefulness after Sleep onset (WASO), defined as time spent awake between the Sleep onset and the end of Sleep; total Sleep time (TST), defined as SPT minus WASO; number of nighttime wakefulness (NNW) was number of awakenings per hour SPT; Sleep latency defined as time between turning off the lights to the first epoch of any Sleep; Rapid Eye Movement (REM) latency, defined as time between Sleep onset to the first R EM epoch; minimum oxygen defined as minimum value of blood arterial oxygen saturation which measured by pulse oximeter; peak wave period (PWP) was, the duration of the dominant arousal wave at night. Arousal Index (AI) was calculated as number of nighttime arousals divided by TST. Sleep Efficiency (SE) was calculated as TST divided by SPT and TST divided by the time in bed. Apnea Hypopnea Index (AHI) defined as the number of apnea and hypopnea per hour in TST. Periodic Leg Movement Index (PLMI) was the ratio of number of movements that meet the criteria for periodic leg movement and the total Sleep period during which leg movements are recorded. Movement was EMG activity during arousal reaction. The percentage of TST in each Sleep stage (Non Rapid Eye Movement (NREM) 1-N1, NREM 2-N2, slow wave Sleep, including NREM 3).

Statistical Evaluation

In this study, statistical analysis was performed using SPSS 18.0 (Statistical Package for the Social Sciences). A p value < 0.05 was considered statistically significant. Since the group contained less than 30 members, non-parametric tests were used. Continuous variables were presented as mean and standard deviation, and categorical variables were presented as frequency and percentage. In the analysis, Mann Whitney U, Chi-square, Fisher exact Chi-square, Spearman correlation analysis of homogeneous of variance tests were used, and Levene test was used for the homogeneity of variance.

Results

86.7% of the patients in Group I were female and 13.3% were male and there was a statistical difference in the gender distribution between the two groups (χ^2 :5.78, p: 0.01). 13.3% of the patients in Group I, 4.8% of the patients in Group II were divorced but no significant difference was observed between two groups (χ^2 :1.37, p: 0.50). Education level was mostly high school and mean age distribution and mean Body Mass Index is similar in both groups (Table 1).

We determined of DES score was 42.65 ± 15.04 in a part of parasomnia patients (n=15). This was shown that these patients had probably dissociative Disorders also. According to SCID-D evaluation these patients diagnosed with dissociative disorder, dissociative amnesia was detected in 33.3%, dissociative fugue in 13.3%, and dissociative disorder that cannot be named otherwise in 53.4%. We found CTQ-28 score 11.14 ± 3.55 in Group I that indicated sexual or physical abuse and neglect too. We determined that Group I patients BDI score was 23.93 ± 6.2 (moderate depression), HDRS score was 16.26 ± 3.76

(moderate depression). Patients in Group I were depressed, according to both the clinician’s and their own views on the subject. There were a statistically significant difference between the groups in terms of the total score of the clinical scales of DES, CTQ-28, BDI and HDRS scores (z: -5.06, p: 0.00, z: -2.78, p: 0.00; z: -3.49, p: 0.00, z: -4.03, p: 0.00) (Table 2).

Subjective Sleep quality, the primary component of PSQI, Sleep latency, the secondary component of PSQI, and Sleep Disorders, the fifth component of PSQI were statistically different in two groups (z: -2.19, p: 0.03, z: -3.26, p: 0.00, z: -2.95, p: 0.01).

ISES GSE subgroup scores were 3.59±1.29 and 2.45±0.89 and total scores were 5.55 ± 2.16 and 4.33 ± 1.77 for Group I and Group II and statistical difference was detected between the two groups (z: -2.60, r: 0)

Group I (n=15)			Group II (n=21)		χ ²	p
n	%	n	%			
Gender						
Female	13	86.7	10	47.6	5.78	0.01
Male	2	13.3	11	52.4		
Marital status						
Single	3	20.0	7	33.3	1.37	0.5
Married	10	66.7	13	61.9		
Divorced	2	13.3	1	4.8		
Education level						
Illiterate	1	6.7	0	0.00	1.99	0.57
Primary education	2	13.3	2	9.5		
High school	6	40.0	9	42.9		
License school	6	40.0	10	47.6		
	Mean ± SD		Mean ± SD		z	
Age	34.73 ± 11.11		35.19 ± 11.17		-0.145	0.89
Height	1.59 ± 0.07		1.68 ± 0.11		-2.142	0.03
Weight	62.60 ± 9.79		9.57 ± 11.86		-1.526	0.13
BMI	24.46 ± 3.74		24.38 ± 2.71		0.42	0.68

z: Mann-Whitney U Test, SD: Standard Deviation, χ²: Chi-Square test

Table 1: Demographic Characteristics of the Groups and Their Comparison

(Table 2).

PWP of arousals duration were 32.36 ± 19.89 second in Group I, 18.23 ± 18.95 second in Group II. NNW were 1.84 ± 0.91 per hour in Group I, 1.13 ± 1.02 per hour in Group II. Statistical difference in the duration of waves where the Sleep is superficial and NNW was detected between the two groups (z: -3.37, r: 0; z: -2.55, p: 0.01). N1 mean ratio was 5.30 ± 1.71% in Group I patients and 3.19 ± 1.78 in Group II patients. There were statistical difference between two groups (z: -3.10, p: 0.001). In all of the patients who had parasomnia, Sleep arousals were with delta waves. In group I, 12 patients (80%) and in group II, 13 patients

Variables	Group I (n=15)	Group II (n=21)	z	p
CTQ-28	11.14 ± 3.55	7.80 ± 2.21	-2.78	0
PSQI				
Subjective Sleep quality	2.06 ± 0.79	1.42 ± 0.74	-2.19	0.03
Sleep latency	1.80 ± 0.56	1.19 ± 0.40	-3.26	0
Sleep period	1.40 ± 1.18	1.04 ± 0.86	-0.81	0.42
Habitual Sleep efficiency	2.53 ± 0.99	2.42 ± 1.07	-0.29	0.77
Sleep disturbances	2.53 ± 0.51	2.00 ± 0.44	-2.95	0
Use of Sleeping medication	2.13 ± 1.30	1.42 ± 1.46	-1.55	0.12
Daytime dysfunction	2.20 ± 0.77	1.66 ± 0.85	-1.9	0.06
Total Points	14.66 ± 3.51	11.19 ± 3.21	-2.76	0
ISES				
GSE	3.59 ± 1.29	2.45 ± 0.89	-2.6	0.01
LR	1.96 ± 1.40	1.97 ± 1.16	-0.38	0.7
Total Points	5.55 ± 2.16	4.33 ± 1.77	-1.96	0.05
BDI	23.93 ± 6.25	11.57 ± 10.78	-3.49	0
HDRS	16.26 ± 3.76	7.57 ± 5.47	-4.03	0

z: Mann-Whitney U test, DES: Dissociative Experiences Scale, CTQ-28: Childhood Trauma Questionnaire-28, PSQI: Pittsburg Sleep Quality Index, ISES: Iowa Sleep Experiences Survey, GSE: General Sleep Experience, LR: Lucid Dreams, BDI: Beck Depression Inventory, HDRS: Hamilton Depression Rating Scale

Table 2: Identifier Properties of the Clinical Features of Group

Variables	Group I (n=15)	Group II (n=21)	z	p
PWP	32.36 ± 19.89	18.23 ± 18.95	-3.37	0
Movement	1.00 ± 0.00	0.95 ± 0.21	-0.85	0.39
SL	10.77 ± 11.10	9.21 ± 10.21	-0.79	0.43
SPT	410.69 ± 15.74	422.22 ± 34.02	-0.85	0.39
TST	371.94±37.11	383.65±46.81	-1.11	0.27
WASO	38.12 ± 38.32	38.25±36.99	-0.02	0.98
NNW	1.84±0.91	1.13 ± 1.02	-2.55	0.01
Min O2	91.93 ± 2.84	89.34 ± 8.32	-0.87	0.38
	Mean ± SD	Mean ± SD	z	p
N1	5.30 ± 1.71	3.19±1.78	-3.1	0
N2	62.45 ± 6.25	59.99 ± 13.39	-0.13	0.89
N3	24.06±6.55	30.63 ± 21.65	-0.67	0.5
REM	8.06 ± 6.25	7.89 ± 7.75	-0.27	0.78
SE	88.24 ± 8.41	89.07 ± 9.54	-0.45	0.65
Arousals	23.26 ± 26.55	60.33 ± 93.47	-0.9	0.37
AI	3.84 ± 4.23	11.04 ± 16.34	-0.75	0.45
AHI+PLMI	8.03 ± 14.62	4.08 ± 4.81	0.35	0.65
	n=15 %	n=21%	χ²	p
Alpha wave	12 80	1361.9	0.29	0.29
Delta wave	15 100	21100		

z: Mann-Whitney U Test, χ²: Chi-square test, SD: Standard Deviation, PWP: Peak Wave Period, Movement: EMG activity during Arousal reaction, SL: Sleep Latency, SPT: Sleep Period Time, TST: Total Sleep Time, WASO: wakeup after Sleep onset, NNW: Number of Nighttime Wakefulness, Min. O2: Minimum O2, SE: Sleep Efficiency, AI: Arousal Index, AHI + PLMI: Apnea Hypnoea Index+ Periodic Leg Movement Index

Table 3: Comparison of Sleep Parameters of the Groups.

(61.9%) Sleep arousals had also with alpha wave in addition to delta wave. There was no statistical difference between these ratios (Table 3).

Discussion

This study aimed at describing correlation between parasomnia and dissociative disorder. We found NREM parasomnia and dissociative disorder more common in females. Schenck et al. showed that dissociative disorder and NREM parasomnia occur more frequently in women, and men who have SW and ST [20]. The other research was emphasized that Sleep-related dissociative Disorders are more frequently observed in females [1]. It stated that dissociative Disorders are mostly observed in women in the other study [21]. In our study there were no association among age distribution, marital status, education level and BMI. It was reported that there is not sufficient information on demographic data such as gender and weight in parasomnia [22]. Higher ratio of females in Group I suggested that dissociative Disorders are frequently observed in females. Further studies is necessary make clear among sociodemographic data, parasomnia and dissociative Disorders.

We determined a part of the patients of parasomnia had dissociative Disorders too and called Group I. Patients who diagnosed with dissociative disorder was detected dissociative amnesia in 33.3%, dissociative fugue in 13.3%, and dissociative disorder that cannot be named otherwise in 53.4%. In our study in Group I had also sexual or physical abuse and neglect.

The correlation among dissociation, childhood neglect and abuse were shown in both prospective and retrospective studies [23-25]. Personality dissociation that develops to protect oneself from intense anxiety in the face of danger or intense stress can manifest itself in the form of dissociative amnesia, dissociative fugue, depersonalization, SW and ST [26]. Some authors report that Sleep-related aggressive behavior can be correlated with dissociative identity disorder in particular, dissociative fugue or dissociative disorder that cannot be named otherwise [8,20]. It is emphasized that the dissociative experiences during the daytime for those exposed to traumatic events can also occur at night and can be a cause of parasomnia [9,27]. It is known that undesired repressed traumatic experience re-emerges in deep wave phase [28]. If SW and ST are the answers to the thoughts in trauma-related deep wave Sleep, parasomnia can be accepted as the variant of a dissociative process and can be hypothesized that it disrupts Sleep by forming an arousal situation. In our study, significant high scores in Group I DES and CTQ-28 can be correlated with dissociation, childhood traumas and recurring traumas and Sleep-related experiences.

We found patients in Group I were depressed, according to both the clinician's and their own views on the subject in our study. It reported that depressive and dissociative Disorders are frequently observed together [5]. In some patients with dissociative amnesia, depression symptoms can accompany [6]. It was reported that in some patients with major depressive disorder that may be associated with Sleep disorder, EEG may have alpha intrusions in delta wave Sleep, and especially this finding can be seen in treatment-resistant major depressive disorder [29]. Whether the presence of an alpha delta wave pattern with a wake-up reaction in PSG evaluations in patients with depressive disorder, or the ability of patients with alpha delta patterns to develop a depressive disorder in PSG studies is debatable. Pelin et al. reported a case of dissociative disorder and parasomnia in a patient with psychometric examination and depressive disorder [30].

These findings suggest that depressive symptomatology may be more frequent in patients with parasomnias and dissociative Disorders than patients with parasomnia alone.

Zadra et al. were reported that NREM parasomnia episodes can be alpha, theta and delta wave or a combination of them without full awakening [31]. It was emphasized that, in PSG examination, hypersynchronous delta wave activity is seen at the beginning of NREM parasomnia episode [32], and that spectral wave power and slow delta waves were seen before the beginning of parasomnia episodes [8]. In our study, Group I had Sleep quality failure, delayed Sleep latency and Sleep Disorders, with subjective evaluation of Sleep. And also polysomnographic evaluation of Sleep pattern showed us NNW and N1 phase percentage extent, presence of delta slow wave activity at the beginning of NREM parasomnia episodes, support NREM parasomnia. Moreover, additional alpha wave activity in 80% of the patients in Group I and 61.9% of Group II support NREM parasomnia nature. The presence of a certain hierarchy of arousals suggests that the first developing autonomic/subcortical activation is cortical and often motor activation may be a consequence of the arousal order. Parrino et al. based on AASM definition, emphasized that other than the arousal reaction in the Sleep, K-complex and delta bursts can be seen and these can arise due to autonomic functions. Besides the Sleep-like features of the delta burst and K-complex, their effect on cerebral activation is attracting interest [33]. Although slow EEG components such as delta wave bursts and K-complex, and traditional arousals such as fast rhythms are different in EEG, they may participate in the complex of cerebral activation. The fact that arousal reactions of all patients took place in slow wave component support that these waves may have affect the cerebral activation. Studying traumatic experiences that can cause dissociative disorder under the subject of increased arousal [9,10] supports the fact that these experiences continue during the Sleep [9]. A more meaningful superficial Sleep transition in Group I patients with dissociative Disorders may be due to the fact that traumatic experiences hold an important place in their etiology. As long as Sleep-related dissociative disorder diagnosis is not made, it can be considered that arousal parasomnias such as SW and ST originate from the dissociative Disorders and is a protector dissociative mechanisms. SW and ST can develop due to reduced cortical inhibition during Sleep. In our study, the number of the night arousal, arousal wave duration, and elevation in N1 phase percentage suggest that parasomnia and dissociative disorder together contribute to arousal reactions.

The limitations of our study are as follows:

- 1) Studies that will be conducted in a wider group of patients will provide results that will yield more reliable results.
- 2) The fact that we cannot perform PSG two nights in a row is another limitation of our study.

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