Research / Araştırma

Evaluation of Impulsivity and Decision Making in Early and Late-Onset Alcohol Addiction

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ABSTRACT

Evaluation of impulsivity and decision making in early and late-onset alcohol addiction

Objective: In this study we aimed to compare impulsivity and decision-making (DM) in early and late-onset alcohol addicts and investigate the relation between impulsivity and DM.

Method: In our study, impulsivity and DM were evaluated respectively with Barratt Impulsivity Scale (BIS-11) and Iowa Gambling Test (IGT) in total 55 alcohol addicted male patients, 27 of them were early onset and 28 were late onset. Early and late onset groups were compared in terms of Obsessive Compulsive Drinking Scale (OCDS), alcohol amount that was consumed per day and the family history of alcoholism.

Results: While only 33.3% of patients in early onset group were married, the patients in late onset group who were married were found to be 71.4%. There was a history of alcohol addiction respectively in the family of 66.6% of early onset group and of 39.3% of late onset group. In early onset group, attention and motor impulsivity were at more significant level than late onset group. In early onset group; OCDS score were at significant level more than late onset group. It was determined that there is no difference in terms of DM which was evaluated from the early stage to the last stage of IGT. Negative correlation was found between education period and attention impulsivity. Negative correlation was determined at significant level between age of regular alcohol usage, alcohol amount that was consumed per day, attention impulsivity and OCDS. Positive correlation was determined at significant level between alcohol amount which is used per day, attention, motor, non-planning impulsivity and OCDS. Increased amount of alcohol that was consumed per day and high OCDS score are effect attention impulsivity in regression analysis. Increased amount of alcohol that was consumed per day is effects motor impulsivity.

Conclusion: While impulsivity in early-onset alcohol addicts is at more significant level than late-onset group, it was determined that there is no difference of DM between two groups.

Key words: Decision making, early-late onset alcohol addiction, impulsivity

ÖZET

Erken ve geç başlangıçlı alkol bağımlılığında dürtüsellik ve karar vermenin değerlendirilmesi

Amaç: Bu çalışmada erken ve geç başlangıçlı alkol bağımlılarında dürtüsellik ve karar vermenin (KV) karşılaştırılması ve dürtüsellik ile KV arasında ilişki olup olmadığının araştırılması amaçlanmıştır.

Yöntem: Çalışmamızda 27'si erken başlangıçlı 28'i geç başlangıçlı olmak üzere toplam 55 erkek alkol bağımlısı hastada Barratt Dürtüsellik Ölçeği (BIS-11) ile dürtüsellik, Iowa Kumar Testi (IKT) ile de KV değerlendirildi. Erken ve geç başlangıçlı gruplar ayrıca Obsesif Kompulsif İçme Ölçeği (OKİÖ), günlük kullanılan alkol miktarı ve ailedeki alkolizm öyküsünün varlığı açısından da karşılaştırıldı.

Bulgular: Erken başlangıçlı grupta hastaların yalnızca %33.3'ü evli iken, geç başlangıçlı grupta hastaların %71.4'ü evliydi. Erken başlangıçlı grubun %66.6'sının, geç başlangıçlı grubun %39.3'ünün ailesinde alkol bağımlılığı öyküsü vardı. Erken başlangıçlı grupta dikkat ve motor dürtüsellik geç başlangıçlı gruba göre anlamlı düzeyde yüksek bulundu. Erken başlangıçlı grupta OKİÖ puanı geç başlangıçlı gruba göre anlamlı düzeyde fazlaydı. IKT'nin ilk aşamasından son aşamasına kadar IKT puanı ile değerlendirilen KV'nin iki grup arasında farklı olmadığı saptandı. Eğitim düzeyi ile dikkat dürtüsellik arasında negatif korelasyon saptandı. Alkolü düzenli kullanım yaşı ile günlük kullanılan alkol miktarı, dikkat dürtüsellik, OKİÖ puanı arasında anlamlı düzeyde negatif korelasyon saptandı. Günlük kullanılan alkol miktarı ile dikkat, motor, plan yapmama dürtüsellik ve OKİÖ puanı arasında anlamlı pozitif korelasyon saptandı. Regresyon analizinde dikkat dürtüsellikteki artışa günlük kullanılan alkol miktarının ve OKİÖ puanının fazla olmasının etkili olduğu saptandı. Motor dürtüsellikteki artışa günlük kullanılan alkol miktarının fazla olmasının etkili olduğu saptandı.

Sonuç: Erken başlangıçlı alkol bağımlılarında dürtüsellik geç başlangıçlı gruba göre anlamlı düzeyde fazla bulunurken, iki grup arasında KV'nin farklı olmadığı saptandı.

Anahtar kelimeler: Karar verme, erken-geç başlangıçlı alkol bağımlılığı, dürtüsellik

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INTRODUCTION

It was stated that the fact that alcohol addicts were separated into two groups as early and late-onset is a valid separation in alcohol addiction classification, these two groups were separated from each other in terms of epidemiological, personality, clinic, comorbidity features and rates and symptom intensity (1). It was shown that cognitive functions were associated with risk of alcohol addiction and that (2) this had prognostic significance in alcohol addiction (3). Different results were obtained from studies in which neuropsychological functions were compared in early and late onset alcohol addicts. In the study, which was carried out in our country, no difference was found among two groups when neuropsychological test performances of early and late onset alcohol addicts were compared (4). In another study, contrary to expectations, early onset alcohol addicts showed higher performance in Stroop test (5). Cognitive functions include other functions such as attention and working memory in addition to executive functions. The executive functions include planning, organization, being able to behave flexibly according to changing conditions, making decision, maintaining to behave accordingly and being able to cease inappropriate and impulsive behavior or selection (6). Cognitive functions and impulsivity interact with each other. The impulsivity means having a tendency to react fast and in an unplanned way for internal or external stimulus by neglecting negative results and a failure in opposing to a stimulus or warning. The impulsivity includes lack of attention, not being able to prevent reaction, looking for excitement and pleasure (7). It was stated that the impulsivity is a structural risk factor for addiction (8). It was shown in many studies that early onset alcohol addicts are more impulsive than late onset alcohol addicts (9,10). The impulsivity manifests itself with impulsive actions, decisions and selections. Decision-making (DM) is a cognitive process, which provides that the most proper possibility is selected. It is thought that in addition to cognitive and affective factors, pleasure and reward expectancy belonging to selection also affects DM (11). Greatness of award and delay period elapsing between giving this award determine value of price. When delay period is too much, small award, which is given immediately, can be selected instead of big one. If the delay period is short, normal people select bigger award. People, whose impulsivity is high, select small award more easily (12). Although cases having prefrontal cortex (PFK) have normal intellectual capacity, they cannot learn from mistakes that they made in the past, have difficulty in evaluating benefit and damage and repeat making similar mistakes (13). In a similar way, for those having PFK damage, it was observed that alcohol and substance addicts also tend to awards which yield profit in the short term in spite of long-term negative results. Iowa Gambling Test (IGT) is a test developed by Bechara et al. (14) imitating real life in terms of price, punishment and uncertainty. It was stated that DM that was evaluated with IGT was ruined in the cases having PFK damage and in alcohol and substance addicts (15). The studies that were carried out before show that alcohol addicts are more impulsive than controls (16,17) and DM is much ruined (15). Impulsive selection is evaluated with DDT (Delay Discounting Test). Impulsive selection may cause impulsive actions because of lack of motor inhibition (18). The impulsive selection is also related to decision-making process. In literature, it is seen with this test that alcohol addicts have impulsivity (16) and that DM is evaluated. When compared with early and late onset alcohol addicts, it was shown that DM was affected in early onset alcohol addicts (10). However, the number of studies carried out in this field is few.

Impulsivity and DM can be also evaluated with behavior scales in addition to their self-report scales (19). The purpose of our study is to evaluate impulsivity with Barratt Impulsivity Scale (BIS-11), which is a self-report scale, compare DM which is one of the cognitive functions with IGT, which is a behavioral scale in early and late onset alcohol addicts and also to determine whether there is a relation between impulsivity and DM. The researchers were expecting that impulsivity and DM could be ruined in early onset cases more than late onset cases.

METHOD

Male outpatient and inpatients who were followed by Alcohol and Drug Research, Treatment and Training Center (AMATEM) of Izmir Training and Research Hospital between the dates of July 2011 and July 2012, got diagnosis of alcohol addiction according to DSM-IV TR diagnosis scales, knew at least reading and writing, were 18-64 years old and who were not under the influence of or in the absence of alcohol were included in the study. Patients who used psychotropic drugs such as antipsychotics, antidepressants and anxiolytics, had another axis 1 comorbid diagnosis apart from alcohol addiction when SCID-I was applied and also used psychoactive substance apart from nicotine were excluded from the study, although they fulfilled these criteria. 58 patients were interviewed and 3 outpatients were excluded from the study because they did not fill the self-report scales completely. While some outpatients did not want to participate in the study although they fulfilled requirements of being included in the study but all inpatients were eager to do that. In total, 55 patients were included in the study. As defined in alcohol addiction classification of Cloninger, onset after 25 years old was accepted as late onset and onset before 25 years old was accepted as early onset (20). With sociodemographic data form, use of alcohol in the family and daily alcohol content were examined. In calculating amount of daily standard drinks, a small bottle of beer of 330 ml, a glass of wine of 140 ml, one shot vodka, whiskey, gin, raki of 40 ml were accepted as 1 (one) standard drink according to the values accepted in previous studies (21). BIS-11, Obsessive Compulsive Drinking Scale (OCDS) were given and IGT was applied to the patients. Before starting to carry out the study, approval of Ethical Committee of Izmir Atatürk Training and Research Hospital was obtained. The patients taken into working group were informed about research properties and scales to be applied and voluntary consent form was obtained from each patient, this form stated that they wanted to participate into study.

Measures

Clinic Interview Scale (SCID-I) which was structured for DSM-IV Axis I Disorders: It is structured interview table which was applied by clinician to determine Axis I diagnoses. SCID-I was translated into Turkish by Corapcioglu et al. (22) and validity and reliability studies were carried out.

Barratt Impulsivity Scale (BIS-11): This is a scale filled by the patient who is used for evaluating the impulsivity. It consists of 30 clauses. In BIS-11, 4 different subscores are obtained. These are: total score, motor impulsivity, attentional impulsivity and non-planning. The higher total BIS-11 score shows the higher impulsivity. Turkish validity and reliability study of BIS-11 was carried out by Gulec et al. (23).

Iowa Gambling Test (IGT): There are four packs of card, these are A,B,C and D. In the beginning of test, points representing money are given to the patient. In our study, cards, which were prepared for this test, were used. The case selects a card from one pack each time. Profit is gained or lost according to number written in the selected card. Although gain is high for only one selection in A and B packs, these are disadvantaged packs because there are unexpected high losses. Although amount, which is gained for only one selection in C and D packs, is little, the losses are little and these packs are generally advantageous packs. Total card number opened in IGT is 100 and each 20 group represent a subgroup. This also corresponds to four learning phases, first 20 cards (0-20) show guess, second 20 cards (21-40) pre hunch, third 20 card (41-60) hunch, forth (61-80) and fifth (81-100) 20 show conceptual knowledge. After making a little random selection, normal cases start to avoid disadvantageous packs. It was developed by Bechara et al. (13). Turkish validity and reliability study of the scale was carried out by Gulec et al. (24).

Obsessive Compulsive Drinking Scale (OCDS): This is a self-report scale which evaluates penetrating opinions causing anxiety accompanied with alcohol

craving and rituals which are made by considering alcohol craving occurring during the period of stopping drinking alcohol. Total score of the scale consists of arithmetic total of point of each substance. It was developed by Anton (25). Validity and reliability study of Turkish form was carried out by Evren et al. (26).

Statistical Analysis

All statistical analyses were made by using SPSS for Windows 20.0 package program. Chi square test was used for categorical variables when comparing groups. When distribution of numeric variables was evaluated with Kolmogorov-Simirnov test, $p < 0.05$ was found and it was determined that the distribution was not normal. Numeric variables were compared with Mann Whitney-U test. While DM was being evaluated, there were total IGT consisting of 100 cards was divided into five groups with 20 cards and total score was calculated on 100 cards. The number of card selected from advantageous C and D packs was subtracted from the card number selected from disadvantaged A and B packs and the score was calculated. Two-way Repeated Measures Variance Analysis was used to compare IGT scores of five packs among groups. Spearman correlation analysis was used to evaluate the relation between alcohol amount used daily, DM, impulsivity and obsessive-compulsive drinking. Linear Regression Analysis was applied to evaluate whether age, period of education, alcohol amount used daily, obsessive-compulsive drinking and DM would affect the impulsivity and besides this by using the same variables, whether impulsivity would affect DM or not. According to result model which was obtained; regression coefficient belonging to each factor, standardized regression coefficient and significance levels were calculated. $p < 0.05$ was accepted as statistically meaningful for the results.

RESULTS

In total, 55 male alcohol addicts were included in the study, 27 of these male alcohol addicts were early onset and 28 were late onset. Sociodemographic data

Table 1: Socio-demographic and clinical variables

	n/Mean	SD	%
Age	45.4	10.7	
Civil status			
Married	29		52.7
Single/divorced/separate	26		47.3
Education period	7.7	4.4	
Alcoholism in the family			
Yes	29		52.7
No	26		47.3
Age of regular use	28.8	9.9	
Barratt Impulsivity Scale-11			
Attention	16.3	4.1	
Motor	22	5.5	
Non planning	27.3	5.6	
Obsessive Compulsive Drinking Scale	29.5	11.1	

SD: Standard Deviation

of the patients and characteristics of use of alcohol are given in Table 1. Mean age of the patients was found as 45.4 (SD=10.7). 29 (52.7%) of the patients were married, 26 (47.3%) were single, divorced or separated. Mean education period of the patients was found as 7.7 (SD=4.4). Alcoholism history was determined in first-degree relatives of 29 patients (47.3%). Mean of age of using regular alcohol of the patients was found as 28.8 (SD=9.9).

In Table 2, comparison of early and late onset alcohol addiction is given in terms of sociodemographic and clinical data. While 33.3% of the patients in early onset group were married, 71.4% of the patients in late onset group were married. The difference was statistically significant (p=0.005). In 66.6% of early onset group and in 39.3% of late onset group, there was history of alcohol addiction in the family. The difference was statistically significant (p=0.042). Attentional and motor impulsivity were high in early onset group more than late onset group (p=0.026 and p=0.039). In early onset group, OCDS point was significantly higher than late onset group (p=0.005).

It was found that there was no difference in early and late onset alcohol addicts in terms of age, period of education; alcohol amount used daily and IGT score. Mean of age was 39.2 (SD=10.9) in early onset group and it was 51.3 (SD=6.1) in late onset group. Mean period of education of early onset group was found as
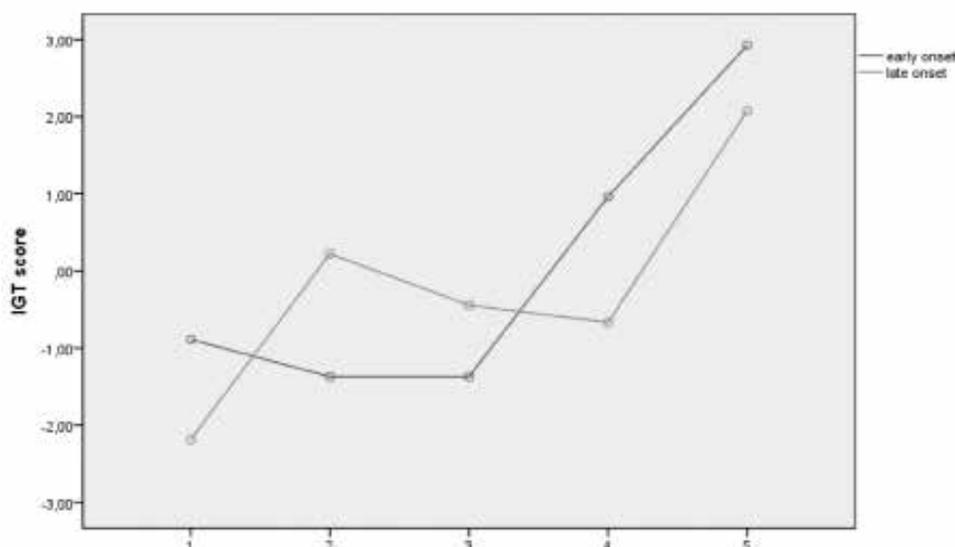
Table 2: Comparison of early and late-onset alcohol addicts in terms of socio-demographic and clinical data

	Early Onset			Late Onset				
	n/Mean	SD	%	n/Mean	SD	%	χ^2/z	p
Age	39.2	10.9		51.3	6.1		-4.229	<0.001**
Marital status								
Married	9		33.3	20		71.4		
Single/divorced/separate	18		66.6	8		28.6	8.003	0.005*
Education period (years)	7.7	3.9		7.7	4.9			0.985*
Alcoholism in the family	18		66.6	11.0		39.3	4.137	0.042*
Alcohol amount per day (standard drink)	23.6	5.6		20.5	5.1		-1.826	0.068**
Barratt Impulsivity Scale-11								
Attentional	17.6	3.8		15.0	4.1		-2.231	0.026**
Motor	23.6	5.6		20.5	5.1		-2.059	0.039**
Non planning	28.7	5.4		26.0	5.6		-1.746	0.081**
OCDS	33.8	11.0		25.4	9.7		-2.780	0.005**

Chi-square*, Mann Whitney U**, SD=Standard Deviation, OCDS: Obsessive Compulsive Drinking Scale

7.7 (SD=3.9) and the mean of late onset group was found as 7.7 (SD=4.9). Alcohol amount daily used in early onset group was 23.6 (SD=5.6) and in the late onset group was 20.5 (SD=5.1) as standard drink amount. Total IGT point was found as 0.1 (SD=34.7) in early onset group and it was found as -1.8 (SD=29.5) in late onset group. It was determined that DM was not different among two groups from the first phase of IGT to its last phase (Figure 1). Spearman correlation analysis was used to evaluate the relation between alcohol amount used daily, IGT point, impulsivity and OCDS scores. A significant correlation which was at low force, in negative direction and statistical was determined between education period, attentional impulsivity (r=-0.270, p<0.05). A significant correlation was determined between age of regular alcohol usage and alcohol amount which is used daily at medium force (r=-0.444, p<0.01), there was a correlation between attentional impulsivity at medium force (r=-0.325, p<0.01) and there was also a correlation between OCDS score at middle force and in negative direction (r=-0.344, p<0.01). A significant correlation

Figure 1: Comparison of decision making in early and late-onset alcohol addicts

Table 3: Correlations between impulsivity and other variables

	Education period	Age of regular use	Alcohol amount per day	OCDS
Attentional impulsivity	-0.27**	-0.33*	0.50*	0.54*
Motor			0.37*	0.37*
Non planning			0.32*	0.44*

*p≤0.01, **p≤ 0.05, OCDS: Obsessive Compulsive Drinking Scale

Table 4: Evaluation of factors which are thought to affect increase in point of attention and motor impulsivity with linear regression analysis

	Regression Coefficient	t	p	Adjusted R²	F
Dependent variable					
Attentional impulsivity				0.400	6.933
Independent variables					
Alcohol amount per day	0.121	2.470	0.017*		
Obsessive Compulsive Drinking Scale	0.121	2.462	0.017*		
Dependent variable					
Motor impulsivity				0.129	2.321
Independent variable					
Alcohol amount per day	0.172	2.184	0.034*		

*p<0.05

was determined between daily used alcohol amount and attentional impulsivity at medium force (r=0.496, p<0.01), there was positive correlation between alcohol daily used alcohol amount and motor impulsivity at medium force (r=0.373, p<0.01), there was also positive direction between non planning at medium force (r=0.319, p<0.05) and OCDS score at medium force (r=0.523, p<0.01). A significant correlation was determined between OCDS score, attentional impulsivity at medium force (r=0.541, p<0.01), between OCDS score and motor impulsivity at medium force (r=0.371, p<0.01) and there was also correlation in positive direction (r=0.439, p<0.01) between OCDS point and non planning at medium force. The variables for which significant correlation was determined in terms of impulsivity are given in Table 3. A significant relation was determined between attention, impulsivity and alcohol amount which is used daily and OCDS score and motor impulsivity and alcohol amount which is used daily when factors such as age, period of study, alcohol amount which is used daily, OCDS score and DM which were thought that they might affect impulsivity level were evaluated with regression analysis (p<0.05) (Table 4). No significant relation was determined when DM level was evaluated with regression analysis in terms of same factors and impulsivity.

DISCUSSION

The most important result of the study was that while a significant difference was determined between early and late onset groups in impulsivity scores measured with BIS, but DM scores evaluated with IGT were not different and a relation was not determined between decision-making and impulsivity.

The number of addicts who were married in late onset group was significantly higher than those in early onset group. This difference is considered when people start to drink alcohol at early age, this prevents that they establish a continuous relation because of problems of use of alcohol and that marriages in which problems relating to alcohol occurred may result in divorce (27). In the family of 66.6% of early onset group and of 39.3% of late onset group, there was history of alcohol addiction. The difference was statistically significant. This finding is compatible with data of the study, which was carried out in our country (1). No difference was

determined between periods of study of early and late onset groups. It was determined in a study which was carried out in our country that period of education of early onset alcohol addicts are less than late onset alcohol addicts (28). The fact that attentional impulsivity was high was found to be associated with the fact that education level was few. There are studies supporting (29) and not supporting (30) this finding.

As in the study carried out in our country (1), no significant difference was determined between early and late onset groups and alcohol amount which is used daily, however, negative correlation was determined between age of using regular alcohol and alcohol amount which is used daily. There are studies reported that early onset alcohol addicts drink excessive (31,32).

OCDS score which evaluates penetrating opinions causing anxiety accompanied with alcohol craving during the period of stopping drinking alcohol and rituals, which are made, was significantly higher in early onset group than late onset group. Negative correlation was determined between age of using regular alcohol and OCDS score. Similar findings were shown in another study in which this scale was used and the fact that OCDS score was high associated with earlier relapse (33).

It was determined that when alcohol amount that is used daily and OCDS score are high, this causes an increase in attention impulsivity in regression analysis ($R^2=0.40$). The relation between attention, impulsivity, alcohol amount which is used daily and OCDS score was explaining 40% of variance. It was determined that when alcohol amount which is used daily is high; this causes increase in motor impulsivity ($R^2=0.40$). Besides, positive correlation was determined between attention, motor impulsivity, score of non-planning and alcohol amount which is used daily. Similar result was shown in the study in which the impulsivity was related with high level of alcohol and substance usage (34).

In our study, significant positive correlation was determined between OCDS score, attention, impulsivity, motor impulsivity and non-planning. In the study in which similar relation was researched, no relation was determined between impulsivity and obsessive-compulsive drinking, however, significant positive correlation was determined between impulsivity and emotional alcohol craving (35).

The fact that attentional and motor impulsivity were at significant level in early onset group more than late onset group and that negative correlation was found between age of using regular alcohol, attentional impulsivity is compatible with the studies carried out in this field (9,10,36).

No relation was determined between IGT score, alcohol amount that is used daily and OCDS score. In the study in which DM was evaluated in alcohol addicts who never applied to treatment, the fact that no relation was determined between characteristics of use of alcohol and DM is compatible with data of our study (37). In another study, no significant relation was determined between disorder of DM function and highness of alcohol amount, which is, used daily (38).

In our study, no relation was determined between impulsivity and DM. Similarly, Toor et al. (39) did not determine any relation between impulsivity and DM in substance users and also in healthy controls and they alleged that the impulsivity and DM might be functions which are related with different structures. In the studies supporting opposite, it was found that there is a relation between impulsivity and DM process, impulsive addicts are destroyed more in DM process (40), DM is related with dimension of DM of especially non planning and that DM is affected negatively in those whose scores of non planning are high (41,42).

In our study, no difference was determined in DM between early and late onset groups. In the study in which both impulsivity and DM were evaluated in opiate addicts, findings supporting our study were determined, no difference was found in DM although the impulsivity was significantly higher in early and middle onset group than late onset group between three groups as early, middle and late onset groups (43). On the other hand, Gudriann et al. (44) stated that early onset alcohol addicts and those who drink excessive show worse performance than late onset alcohol addicts in terms of DM.

The fact that impulsivity in childhood period

stipulates developing alcohol addiction in adult life (45,46) and it presents more in early onset alcohol addicts makes think that impulsivity characteristic is an existing characteristic before use of alcohol, however, the fact that DM is not different between early and late onset groups in our study makes think that the problem in this function might have been started with use of alcohol. However, it is necessary to have follow-up studies and comparison with control group to be able to say that.

In our study, it was thought that one of the reasons why relation between DM and impulsivity was not determined arises from the fact that both the impulsivity and DM are heterogeneous concepts. It was determined that when DM function was being evaluated with the skin conductivity response, which is stipulated before selecting a card in normal controls, is not observed in the cases having PFK damage and that they are unconcerned with the events which may occur in the future. It was determined that while DM was being evaluated with skin conductivity response in alcohol addicts, one group similarly replied to those having PFK

damage, there was skin conductivity response only in IGT in other group, in other words, after the award, they were oversensitive to the award and that they were oriented with the feeling of award. In both groups, DM was affected and ruined with different behavioral patterns (47). Similarly, the impulsivity is separated into two groups as motor and cognitive. It was determined that while DM process was ruined in those having PFK damage, motor impulsivity was not affected, however, behavioral patterns of those having PFK damage in IGT test and of those having cognitive impulsivity were similar (48).

These are limitations of our study; only male alcohol addicts were included into our study, the number of sample was few, there was not any control group and other cognitive function was not evaluated while evaluating DM, a cognitive function which can be affected in those having cognitive function disorders. A part of studies that were carried out in this field was done in alcohol and substance addicts. Further studies will explain the relation between DM function and impulsivity.

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