

Antisocial Personality Disorder And Right Hemisphere Hypofunction In The Happy-Sad Chimeric Faces Task

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ISPARTA.

Abstract

The purpose of this study is to determine how the hand preference, hand skill, and perception of emotion is affected in Antisocial Personality Disorder (APD). **Method:** For this reason 45 male offenders met DSM-III-R criteria for (APD) and 50 control subjects were recruited to the study. The hand preference was assessed respecting the Edinburgh Handedness Inventory (EHI). To measure the hand skill, Peg Moving Task(PMT) was used. The Happy-Sad Chimeric Faces Task (HCFT) was used to assess perception of facial emotion. **Results:** The difference between hand preference of the two groups were statistically insignificant ($p>0.05$). The difference between Right Handedness and Mix Handedness of the two groups were statistically significant($p<0.05$) respect to PMT. The difference between Mix Hemifacial Bias(MHB) of the two groups was statistically significant($p<0.001$) respect to HCFT. Subjects with APD divided into two subgroups as Violence APD(VAPD) and Non-violence APD(NVAPD). VAPD group exhibited less Left Hemifacial Bias(LHB) than controls. **Conclusions:** These results indicate that there are abnormal cerebral dominance and right hemisphere hypofunction in APD subjects changing to violent and non-violent subgroups.

Keywords: handedness, lateralization, lateralization of emotional perception, antisocial personality disorder.

Mutlu-Mutsuz Şimerik Yüzlerde Antisosyal Kişilik Bozukluğu ve Sağ Hemisfer Hipofonksiyonu

Özet

Bu çalışmanın amacı Antisosyal kişilik bozukluğunda (APD) el tercihi, el becerisi ve emosyon algısının nasıl etkilendiğini araştırmaktır. **Metod:** Bu nedenle APD'deki DSM +II-R kriterlerine uyan 45 erkek hasta ve 50 kontrol hastası çalışmaya alındı. El tercihi EHI'ya göre değerlendirildi. El becerisini ölçmek için HCFT kullanıldı. Yüzdeki emosyonu değerlendirmek için HCF kullanıldı. Bulgular iki grup arasındaki el tercihi yönünden istatistiksel anlamlılık yoktur. $P>0,05$.

Sağ elini kullanma ve her ikisini kullanma arasındaki fark PMT açısından anlamlıydı. $P<0,05$.

MHB yönünden fark HCTF'ye göre anlamlıydı. $P<0,001$

ADD'li hastalar VAPD e NVAPD sub guruplarına göre değişmek üzere APD'de anormal cerebral dominance ve sağ hemisfer hipofonksiyonunu ortaya koymuştur.

Anahtar Kelimeler: El hakimiyeti, lateralizasyon, emasyonel algının lateralizasyonu, antisosyal kişilik bozukluğu.

Several articles have cited different hemispheric specialization (1-4) and frontal lobe dysfunction in various forms of antisocial behaviours (5-10).

Hare, Williamson, and Harpur (11) suggested that evidence for differences in the

processing of verbal material may reflect weaker lateralization of linguistic processes in psychopaths. This interpretation is suggested by the results of a verbal dichotic listening task administered to adult psychopaths (3) and adolescent psychopaths (4). The same reduction in hemisphere asymmetries has also

been found in the visual modality (semantic processing) in psychopaths (12).

A special role for the right hemisphere has been suggested for perception, and expression of facial emotion, and emotional behaviours. In right handers, perception studies have demonstrated a left visual field (i.e. right hemisphere) advantage (left hemifacial bias) for perceiving emotional facial expression (13-17).

Faces perception bias has been studied on some psychiatric disorders, and normal subjects (17-20). The results of these studies showed that happy and sad mood in normal subjects did not influence the perceptual bias. In addition, depression and mania were associated with reduced and increased biases respectively, while schizophrenics showed no bias to either side. They speculated that might be right hemisphere hyperfunction in mania, moderate relative hypofunction in depression, and severe relative hypofunction in schizophrenia.

In this study we investigated how the hand preference, hand skill and the hemifacial bias is affected in APD. We hypothesised that right hemisphere functions may be deteriorated in APD in the HCFT.

Subjects And Method

Subjects

Forty-five male offenders met DSM-III-R criteria for APD and 50 control subjects were recruited to the study. Subjects who are dependent drug or alcohol were excluded.

The offenders ranged in age from 18 to 35 years (23 ± 6) and controls ranged in age from 18 to 40 years (24 ± 6). The education levels of offenders were 34 subjects elementary school, 7 subjects intermediate school, 4 subjects illiterate. Control group consists of education and socio-economic levels matched subjects who do not have any neurological or psychiatric signs and symptoms.

Assessment Of Hand Preference

The hand preference was assessed respecting the Edinburgh Handedness Inventory (EHI) (21). All subjects received a Turkish translation of Oldfield's questionnaire modified by Tan (22). The questions pertained to which hand was used by the subject for writing, drawing, throwing, cutting, brushing, holding the hand of a shovel, knife (without fork), spoon, striking a

match, and twisting off the lid of a jar. The columns "always right", "usually right", "either hand", "usually left", and "always left" were scored as +10, +5, 0, -5, -10, respectively. Following Gechwind's suggestion, the laterality score was taken as the sum of all scores, and no quotient was calculated. The subjects which have the score between -80 to -100 were assessed as left handed, +80 to +100 as RH and -80 to +80 as MH.

Assessment Of Hand Skill

To measure the hand skill, a Peg Moving Task (PMT) was used (23). The pegboard consisted of two parallel rows of 10 peg holes. There were 10 loose-fitting doweling pegs in one row. The subjects were required to insert 10 pegs into the corresponding opposite holes as fast as possible. Pegs were moved from right to left with right hand and then from left to right with left hand. The time elapsed for right and left hand was measured with a chronometer. One trial consisted of the time elapsed to move 10 pegs with one hand. Ten trials were given to each hand, and the time differences between hand skills were analysed using unpaired t test. We accepted the patient as a right handed (RH) or left handed (LH) as a related with the superiority of the hand skill that is statistically meaningful. If the difference was not significant, the patient was accepted as a mixed handed (MH).

Assessment Of Hemifacial Bias

The happy-sad chimeric faces test (HCFT) (24) was given to all subjects and required them to make affective judgements on 48 faces (12 original faces and 12 mirror images, each face presented twice). That is, they were asked to say if each face, viewed in turn in free vision from a booklet, looked happy or sad. Testing took approximately 10 minutes. Left bias was scored by subtracting the number of responses which coincided with the half-face to the (viewer's) left (min=0, max=48) from those which corresponded to the half-face to the right (min=0, max=48). The possible range for left bias scores was therefore +48 to -48.

The subject was judged as Left Hemifacial Bias (LHB), if the left bias score was greater than 0, Right Hemifacial Bias (RHB), if the score was lesser than 0, or mix hemifacial bias (MHB), if the score was equal to 0 (zero).

Results

According to EHI we found that 38(84.44%) offenders right handed(RH), 4(8.88%) left handed(LH), 3(6.66%) Mix Handed (MH) and

44(88.00%) control subjects RH, 3(6.00%) LH, 3(6.00%) MH.

The difference between RH, LH and MH ratio of the two groups were statistically insignificant.

Hand skill of the offenders according to peg moving task results were 28(62.22%) RH, 4(8.88%) LH, 13(28.88%) MH and hand skill of the control subjects were 42(84.00%) RH, 3(6.00%) LH, 5(10.00%) MH. There was statistically significant difference right and mix handedness between these groups on the t test (RH t=2.41, p<0.05; MH t=2.35, p<0.05).

Heller and Levy (15) have found that right handers have a left visual field advantage for the discrimination of facial emotion. LH subjects were found to display no overall advantage for either visual field, though individual left handers manifested reliable advantages for one field or the other. So that happy-sad chimeric faces test results were reviewed for 38 RH offenders and 44 RH controls according to EHI.

18(47.36%) APD subjects and 30(68.18%) controls exhibited LHB. There was no statistically significant difference between these groups on the t test(t= 1.91, p> 0.05.)

4(10.52%) APD subjects and 9(20.45%) controls exhibited RHB. There was no

statistically significant difference between these groups on the t test(t= 1.23, p> 0.05.)

16(42.10%) APD subjects and 5(11.36%) controls were judged as MHB. The t test revealed a very significant difference between the MHB of these two groups(t= 3.18; p<0.001).

APD DSM-III-R criteria divided in to two subgroups as violence including, (such as causing bodily harm to another, rape, extorting, threats of violence, physically aggressive, initiating physical fights, using a weapon in more than one fight, being physically cruel to animals, temper) and non including items. In this way offenders divided into two subgroups as violence APD(VAPD) and non-violence APD(NVAPD).

The EHI, PMT and HCFT results were revised. The EHI results were insignificant according to the new subgroups, too; but peg moving task results were different from previous results. The difference between MH rates of NVAPD and controls was insignificant.

The results of happy-sad chimeric faces test in NVAPD subjects were not different with previous results but, different in VAPD subjects. LHB was found significantly decreased in VAPD subjects than controls. Table-1

Table-1. Comparisons with control and APD, VAPD and NVAPD groups

Edinburgh Handedness Inventory

Hand Preference	Controls(n=50)	APD(n=45)	VAPD(n=24)	NVAPD(n=21)
RH	44(88.00 %)	38(84.44 %)*	20(83.33 %)*	18(85.71 %)*
LH	3(6.00 %)	4(8.88 %)*	2(8.33 %)*	2(9.52 %)*
MH	3(6.00 %)	3(6.66 %)*	2(8.33 %)*	1(4.76 %)*

Peg Moving Task

Hand Skill	Controls(n=50)	APD(n=45)	VAPD(n=24)	NVAPD(n=21)
RH	42(84.00 %)	28(62.22 %)**	15(62.50 %)**	13(61.90 %)**
LH	3(6.00 %)	4(8.88 %)*	2(8.33 %)*	2(9.52 %)*
MH	5(10.00 %)	13(28.88%)**	7(29.16 %)**	6(28.57 %)*

Happy-Sad Chimeric Faces Test

Hemifacial Bias	Controls(n=44)	APD(n=38)	VAPD(n=20)	NVAPD(n=18)
> 0 (LHB)	30(68.18 %)	18(47.36 %)*	8(40.00 %)**	10(55.55 %)*
< 0 (RHB)	9(20.45 %)	4(10.52 %)*	2(10.00 %)*	2(11.11 %)*
= 0 (MHB)	5(11.36 %)	16(42.10 %)**	10(50.00 %)**	6(33.33 %)**

Note. * p > .05. ** p < .05. *** p < .001

Discussion

According to Edinburgh handedness Inventory, no significant differences were found between APD and normals. These results are consistent with some other studies (4,6,8).

However, in the APD subjects, the peg moving task results were different than normal subjects ($p < 0.001$). APD subjects have decreased RH and increased MH but, it was not found that any difference between MH rates of controls and NVAPD subjects. Stein, et al. (25) have found that left-sided neurological soft signs increased in patients with APD and Borderline Personality Disorder to control subjects. Patients with a history of aggression, however, had significantly more right-sided neurological soft signs than those without a history of aggression. Increased neurological soft signs were associated with impairment on the Wisconsin card sort, a test of frontal lobe executive function. Hillbrand, et al. (26) investigated the relationship between cerebral lateralization and overt aggressive behaviour in 41 violent psychiatric patients using the Finger Oscillation Test. They found that patients with the most abnormal pattern of lateralization exhibited the highest frequency as well as the highest severity of overt aggressive behaviour.

It is thought that neurological soft sign and decreased RH may result non-specific brain damage and head injuries. A number of investigators have found that the incidence of non-dextrality is significantly higher in several samples with unequivocal brain pathology than those in general population.(27-29). Lewis et. al.(30) found that early childhood head injuries also have been associated with later delinquency in a prospective research. Although the difference in hand preference is not change, the difference in hand skill may indicate the pathologic process in the brain.

Except for abnormal cerebral dominance in APD (as being manifest in the VAPD) subjects, it was found a reduction in the hemispheric asymmetry (left hemisphere dysfunction) to the dichotic listening task and visual modality (semantic processing) (3,4,12). We also found a reduction in the hemispheric asymmetry (right hemisphere dysfunction) to the HCFT. NVAPD subjects exhibited a significantly increased MHB to normal subjects. VAPD subjects exhibited not only increased MHB but also, a

significantly decreased LHB to normal subjects. These results suggested that NVAPD has less dysfunction (hypofunction) than violent APD in the right hemisphere that predominant perception of facial emotion.

It is suggested that right hemisphere controls are not only on perception and expression of facial emotions, but also related to emotional behaviours (13-17). However, Otto et al.(31) indicated that subjects exposed to stress were exhibiting different behavioural reactions and hormonal levels, altering with right hemisphere activity. It could be argued that right hemisphere hypofunction may cause deterioration in emotional life, and behaviours (i.e. physically cruel behaviour, lack of remorse, and antisocial behaviours) in the APD subjects.

Raine et al. (4) reasoned that it could be argued that psychopaths have either left-hemisphere dysfunction or an interhemispheric transfer deficit rather than being less lateralized for language processes. Hare and Jutai (12) speculated that reduced language asymmetry might reflect a reduction in the role of language in mediating and regulating behaviour in the psychopath, and that psychopaths are less likely to use cognitive and behavioural strategies that rely on the verbal and sequential operations of the left hemisphere.

The hypothesis of prefrontal dysfunction in psychopathy has been pursued for many years. Gorenstein (7) found a relationship between frontal-lobe dysfunction and psychopathy. Hoffman (32) and Hare (3) have attempted a replication of Gorenstein's findings. The results did not support the relationship between frontal-lobe dysfunction and psychopathic personality. Lapierre et al.(10) compared psychopathic criminals with non-psychopathic criminals. Psychopaths were found significantly impaired on all the orbitofrontal-ventromedial tasks.

Prefrontal dysfunction has also been studied in VAPD and NVAPD. Yeudall et al.(6) found prefrontal dysfunction in the delinquent subjects No differences were found between violent and non-violent delinquents. On the contrary of this result, Milner and Petrides(33) found to be significantly more neuropsychologically impaired violent delinquents than those non-violent delinquents. Raine et al. (8) found that murderers had significantly lower glucose metabolism in both lateral and medial prefrontal cortex relative to controls.

In summary, in previous studies and our study it's suggested that abnormal cerebral dominance, prefrontal, right and left hemisphere dysfunction may

present in the APD. It is likely that these findings point out a gross brain dysfunction. The degree of dysfunction, and affected brain regions may be accountable from APD and its subgroups.

Further more specific studies which is done with larger groups will be a good addition in this issue.

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