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A COMPARISON OF FACIAL EMOTION RECOGNITION AND MENTAL FLEXIBILITY IN VARIOUS PATIENTS WITH SCHIZOPHRENIA

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ABSTRACT

Facial emotion recognition and mental flexibility are of effective factors on psycho-social function which seems to involve deficiency in patients with schizophrenia. This study aims at comparing facial emotion recognition and metal flexibility in patients with paranoid schizophrenia, disorganized and undifferentiated.

The research method of present study is causal-comparative. The studied sample included 90 patients with schizophrenia (30 patients with paranoid, 30 patients with disorganized, 30 patients with undifferentiated) who were selected by available sampling method. Face recognition test and Wisconsin card sorting test were used to collect data.

Then the data were analyzed by MANOVA (Multi-variable variance analysis).

The results showed that there is a significant difference between three groups of patients with schizophrenia in anger facial emotion recognition (p<0/05) in which individuals with paranoia schizophrenia acted worse than two other groups in anger facial expression recognition. Also the results showed that there is no significant difference between there groups with respect to flexibility (p>0/05).

The finding state that individuals with paranoid schizophrenia have low flexibility and individuals with undifferentiated and disorganized schizophrenia are in better condition compared to those with paranoid schizophrenia, and this flexibility is of high importance in facial emotion recognition of people, which mainly contributes to social function of people.

Keywords: Schizophrenia, Facial Emotion Recognition, Mental Flexibility, Paranoid, Disorganized, Undifferentiated

INTRODUCTION

Schizophrenia is one of the most important mental disorders which has devoted the major part of psychiatry studies to itself and includes characteristic such as: hallucination, delusion, disorganized speech and behavior, negative signs and social and job function impairments [**5**]. Although schizophrenia is studies as a unit illness, it includes a set of impairments placed on a heterogeneous group and involves patients differ in clinical simulations, response-therapy and disease cycle. The beginning age ranges from 15-35 and this impairment is earlier in men than in woman and its prevalence is higher in low socio-economical classes **[6]**. Schizophrenia is a cerebral-behavioral disease which its symptoms express in adolescence and early in adulthood and classified into several kinds of which is paranoid schizophrenia, a subset of schizophrenia .A main attribution of paranoid schizophrenia is regular delusion and auditory hallucination. Delusions of these patients usually persecutory and grandiosity. Disorganized schizophrenia is another kind of schizophrenia that the most outstanding property is stupidity and clear dissociation, so that they laugh loudly with no proper stimulus, they behave in a happy way but quite bizarre and funny indicating a severe sensitivity and susceptibility to internal symptoms and lack of sensitivity to that of external. Another kind of schizophrenia is undifferentiated one. In this kind of schizophrenia in spite of presence of symptoms of thought disorder, conduct and emotion abnormality, but they are not classified in other kinds **[6]**.

A clear characteristic of schizophrenia is derangement in thought and emotion perceptions. patients with schizophrenia a suffer from a basic problem in perception and facial recognition and emotion **[28]**. Since everyone's face involve some information such as age, gender, race, emotional status and even one's health, it is evident that the significance of correct facial recognition is effective in proper social interactions, so that incorrect interprets of facial emotions in those with schizophrenia is a probable mechanism which leads to an expression of some symptoms like damage delusion and will result in consequences such as function disorder and unsociability and social isolation **[29]**. The presence of improper social interaction in patients with schizophrenia may, itself originates from disability in correct recognition of emotion condition ,increase stress rate and as a result leads to a decreasing social support and decreasing social support also may increasing disorder relapse [**25]**. Thus emotions affect lives notably, especially in interpersonal relations makes relations to continue and facial emotion recognition is regarded as the most underlying element in clinical literature of psychotic from a very long time ago **[7]**. In this relation **[8, 9]**. Believe that patient with schizophrenia have problem in processing frightened faces. [**10, 30]** found that patient with schizophrenia have problem with anger faces. **[11]** showed in a research that these people have problems with repelled faces. Therefore results from studies by **[12, 13]** showed that patients with schizophrenia have problems with happy facial recognition. Also [**14]** found that patients with schizophrenia acted worse than normal people in facial expression emotion recognition such as fear, sadness and anger, but there was no significant difference between these two groups in recognizing neutral facial emotion expression.

Finding the quality of relationship between facial emotion recognition and cognitive function and flexibility in patients with schizophrenia is highly important because, in one hand, in some degree the kind of their relationship show how brain and conduct are related in these patients and, in the other hand, interpersonal interactions can be explained as maladapted **[26]**. The main element in mental flexibility is the ability to change the cognitive sets in order to compatibility with environmental changing stimuli. Researches have defined the mental flexibility as individual's evaluation scale in controllability of situations and this evaluation changed in different situations **[15-16]**. Those who are of the ability of flexible thought use alternative justifications and reconstruct their own thought framework in a positive way. Lack of flexibility is also one of the characteristics of patients with schizophrenia which made disorders in one's daily actions. Many studies have proved cognitive dysfunction in patients with schizophrenia which include deficiencies in abstraction, administrative function, flexibility and problem-solving which these deficiencies are due to dysfunction of temporal and frontal cortex **[43]**. **[35]** in his study on administrative damages of patients with schizophrenia found that cognitive abilities including cognitive flexibility, problem-solving, planning, and active memory of these patient are disordered compared with normal ones, contributed it to a disfunctionality of prefrontal cortex. Since proper facial emotion expression and flexibility in life, especially in social interactions plays an important role and lack of facial recognition and flexibility make disorders in functions of occupation, society and … so the more understanding of facial recognition and flexibility, especially in patients with schizophrenia, is notably important and few studies have been conducted in this field, for this purpose, the present study deals with studying facial emotion recognition and mental flexibility in patients with Paranoia, disorganized and undifferentiated schizophrenia.

METHODOLOGY

The present study was causal comparative in which the three groups of schizophrenia were studied: paranoid, disorganized and undifferentiated. For this purpose, 30 patients with paranoid schizophrenia, 30 disorganized and 30 patients with undifferentiated schizophrenia bedded in rehabilitation centers of Daro-Shafa, SinaMehr, and Yaran in Ardabil city were selected in available sampling method. The criterion of selecting patients was based on psychiatrist diagnosis and structured clinical interview according to DSM-IV-TR criteria by a clinical psychologist, moreover, the criterion of having no concurrent diagnosis of drug-consuming disorder and medical disease were also considered. After classifying patients into three groups of schizophrenia paranoid, disorganized and undifferentiated, facial recognition test and Wisconsin cards sorting test were performed individually on patients and after completing questionnaires, the resulted data were analyzed by SPSS16 software and using MANOVA (Multivariable variance analysis) and ANOVA (single variable variance analysis) techniques of one-way inter-groups.

Research Materials

Recognizing Facial expressions of Emotions test (RFET)

This experiment includes 36 black and white pictures of facial emotions which were conducted by **[20]**. These pictures are images of both man and woman that shows 6 main emotions (fear, anger, sadness, hate, surprise, and joy) and the examinee should recognize considered emotion by looking at each picture, and response. Pictures are graded with 0 and 1 and examinee's function is evaluated by the number of correct responses. **[1]** concluded the reliability coefficient of this test as 0.78 and the reliability coefficient of above test in present study was gained using Cronbach's Alpha as 0.65.

Sorting Wisconsin Cards Testing

This test was compiled by Grant and Berg in 1948 (quoted by 17) then was provided for abstract conduct, set changing and administrative functions. Every examinee was offered a set of 64 cards on which one up to 4 symbols of triangle, star, cross and circle can be seen and each one has four colors: green, red, blue and yellow. The performance method is, in such a way that four cards with different colors, shape and number are lay against examinee as a pattern and the examinee should place other cards in order based on his/her inference of considered pattern. As the examinee could sort five cards in a continuous way based on the color, the examiner considers the criterion of shape and the examinee should realizes the change by examiner saying "that's true" and " that's false" and find new criterion. After placing 5 correct cards based on shape, the examiner changes the criterion to numbers. The exam continues in this way until the examiner replaces 5 cards for six times (i.e. three criteria and each one twice) and puts 64 cards in a group or reports the mentioned underlying principle underlying principle spontaneously for example he/she should say: "You change the principle regularly!", "You skip from number of the patterns to their shapes or colors and then return to first again!". If the set of moving cards got destroyed and put out of order before doing the operations successfully in 6 times, the cards should be ordered again and that set of cards is reused. Generally when 30 to 40 cards are ordered by mistake and examinee seems having no desire in understanding the assignment, exam should be stopped **[18]**. This exam can be scored in several ways, which the most common scoring is recording the number of acquired groups and the error of disability. The obtained groups are attributed to the number of correct cycles or, in other words, 5 correct continuous placing and this is placed in a range of 0 (for those patients who didn't perceive the criterion of an exam at all) to 6 which naturally the exam will be stopped in this state. In cases that the examinee can continue the sorting of cards based on earlier successful principle and also when in the first series, he/she insists on a false early guess in sorting the cards, there is the error of disability to sort. Preservative error is usable and useful for documenting problems in the field of conceptualization, profiting from correcting and flexibility of perceptions. The other error is a specific error which may indicate examinee's guess or evaluation, missing the procedure of current sorting or attempt to invent a complex pattern. **[18]** has mentioned the validity of this exam for measuring cognitive deficiencies followed by brain damages, as over 0.86%. Reliability of this test has been reported by **[19]** as 0.83. **[4]** has reported the reliability of this test as 0.85 and reliability of above test was gained by Cronbach's Alpha as 0.63.

RESULTS

The one-way variance analysis was conducted for the difference between three kinds of schizophrenia: paranoid, disorganized and undifferentiated in each of variables of components of facial emotion recognition and its results are given in **Table 1**.

As it can be observed in **Table 1**, 8.9 percent (8 people) of patients with schizophrenia are in the range of 20-30 age and 24.4% (22people) are in the age range of 31-40, 41.1% (37 people) in the age range of 41-50 and 25.6% (23people) in the age range of 51-60.regarding the marital status, 77.8% (70 people) of patients were single and 22.2% (20 people) were married. With respects to education status, 48.9% (44people) of patients were in elementary degree, 20% (18 people) guidance, 27.8 (25 people) diploma and 3.3% (3 people) bachelor. Considering their economic status 47.8% (43 people) were in low class, 38.9% (35 people) were in middle class and 13.3% (12 people) were in high class. Multivariable variance analysis (MANOVA) was performed on several independent variables: emotion recognition components, and flexibility. The dependent variable included schizophrenia (paranoid, disorganized, undifferentiated). No excessive score, outlier data or exceed from statistical defaults was observed in present data. The non-significance of M-Box test ($P>0.05$) showed the equality of variance-covariance matrix of related variables in independent variable levels. Using Lamboda Wilkes **(Table 2)** showed that the dependent variable is significantly susceptible to the main effect of schizophrenia, Lomboda Wilkes =0.722, $F_{(16.160)}= 1.77, p<0.05$, Eta= 0.151. For locating the statistical significance of multivariable effect on dependent variables, single-variable variance analysis was individually performed that is shown in **Table 2**.

Table 2 shows that schizophrenia from six-fold components of facial emotion recognition has just affected the anger component ($F(2,87) =3.40$, $p<0.05$) and Eta=0.073). Touch post hoc test (HSD) was used to get information about which group's difference is significant in facial emotion recognition of anger and its results are given in **Table 3**.

As it can be seen in **Table 3** the HSD Test showed that scores of paranoid schizophrenia in anger is significantly higher (M=4.36,SE=0.30) than disorganized schizophrenia (M=3.66,SE=0.302) and undifferentiated schizophrenia (M=3.26,SE=0.30), and this implies that patients with paranoid schizophrenia are more deficit in anger emotion recognition than two other groups. Also scores of paranoid schizophrenia in preservative error are significantly higher (M=33.53,SE=4.52) and disorganized (M=18.10, SE=4.52) and undifferentiated schizophrenia (M=28.90,SE=4.52).

Table 1: Demographic Situation of Participants

Variables		Frequency	Percent
Age	20-30	8	8.9
	31-40	22	24.4
	41-50	37	41.1
	51-60	23	25.6
Marital status	Single	70	77.8
	Married	20	22.2
Education status	Elementary	44	48.9
	Guidance	18	20
	Diploma	25	27.8
	Bachelor	3	3.3
Economic status	Low	43	47.8
	Middle	35	38.9
	High	12	13.3

Table 2: Multivariable and Single Variable Variance Analysis for the Measurement of Facial Emotion Recognition and Flexibility

Multivariable[a]		single variable[b]							
Source	F	anger	fear	sadness	surprise	hate	joy	flexibility	preservative
Schizophrenia	1.77*	3.40*	1.37	0.49	0.48	0.89	0.46	0.98	3.06
MSE		2.73	0.42	0.62	1.3	0.31	1.88	683.88	614.65

NOTE: *P< 0/05; note: multivariable F ratio was given by Lamboda Wilkes test; a. free rate of multivariable=16,160 , b. free rate of single variable=2, 87

Table 3: Mean Scores and Standard Deviation For Measures of Facial Emotion Recognition and Flexibility as a Function of Schizophrenia Kinds

Variable	Paranoid		Disorganized		Undifferentiated	
	M	SE	M	SE	M	SE
Anger	4.36[a]	0.30	3.66	0.30	3.26	0.30
Fear	4.43	0.11	4.36	0.11	4.16	0.11
Sadness	4	0.14	3.8	0.14	3.86	0.14
Surprise	4.13	0.20	3.86	0.20	3.90	0.20
Hate	4.16	0.10	4.33	0.10	4.16	0.10
Joy	2.53	0.25	2.63	0.25	2.86	0.25
Flexibility	38.56	4.77	30.16	4.77	38.20	4.77
preservative error	33.53[a]	4.52	18.10	4.52	28.9	4.52

Note: The Mean Scores With Upper Index a was Significantly Different From Touch Post Hoc Test (HSD) in 0.05 Level

DISCUSSION AND CONCLUSION

The present study aims at comparing facial emotion recognition and mental flexibility in patients with paranoid, disorganized and undifferentiated schizophrenia. The results from this study showed that there is a significant difference between paranoid, disorganized and undifferentiated schizophrenia in facial emotion recognition in anger that is individuals with paranoia schizophrenia act worse than those with disorganized and undifferentiated schizophrenia in anger emotion recognition. Findings of this study were not compatible with those from [**24, 44, 23, 1**]. They concluded that individuals with paranoia schizophrenia in facial emotion recognition of anger act better than those with disorganized schizophrenia. But this result was indirectly and generally compatible with that of **[8, 13, 43, 45]**. They showed in their study that individuals with schizophrenia were of deficit in facial emotion recognition of anger and acted badly. Deficiency in components of facial emotion recognition in individuals with schizophrenia may origins from limited ability of symbolic imaging of others' emotions. These patients have deficiencies in cognitive procedures [**19]** and information processing system **[20]** and also these patients are not able to recognize their own internal emotions and others' external emotions. In fact, they perceive ambiguously others' facial emotions and have problems in recognizing and describing them and often recognize others' facial emotions as neutral **[14]**. Also the relationship of function disorder has been reported with facial emotion processing in the viewpoint of structure in FMRI studies in patients with schizophrenia and is justifiable. Anterior cingulate and orbitofrontal cortex in the processing of angry faces, with increased activity **[21]** and the frightened faces is associated with increased activity in the amygdala **[22]**, who found evidence that patients with schizophrenia are faced with the disorder **(3** quoted). Cognitive pattern is highly damaged in individuals with paranoia than disorganized and undifferentiated patients and this makes that this group of people will inhibit in using approaches of facial emotion expression recognition and their interpersonal and social function damages. Also results showed that there is no significant difference between three groups of paranoia, disorganized and undifferentiated in emotion recognition of fear, sadness, surprise, hate and joy. In the explanation of this it can be said that process and nature of these three groups of schizophrenia may be in such a way that affects such functions identically and makes no significant difference between these three groups. This finding was compatible with findings of **[1, 23, 24, 44]**. They found that there is no significant difference between individuals with paranoia and disorganized in recognizing hate, joy, fear, and emotion.

Also the results showed that although there is no significant difference between three groups of schizophrenia (paranoid, disorganized and undifferentiated) statistically in the field of flexibility, studying mean scores showed that individuals with paranoia have the least flexibility and since one of the main indices of flexibility are the error rate of preservative error. The results showed that the preservative error rate of paranoia is higher than two other groups and the higher preservative error indicates lower flexibility. Evaluation of patients with schizophrenia showed that these patients have deficiencies in sorting Wisconsin cards and this deficit doesn't enable them to reasoning, cognitive flexibility and problem-solving **[36]**. In this relation there was no similar study to study about the flexibility rate and preservative error among patients with schizophrenia, but in general there are various studies show that flexibility rate in patients with schizophrenia is lower and preservative error is higher than normal people **[34, 37, 38, 39]** and the low flexibility indicate general defects in processing information and their cognitive performance [**38]**. Since the results of this study confirm the higher preservative error and lower flexibility in paranoid group, we can say that these results are indirectly in compatible with that of **[34, 37, 38, 39, 41, 46]**. Paranoia patients' poor performance in Wisconsin card sorting test implies that these patients acted poorly in abstraction ability, organized search, understanding the required strategy and solving the problems and generally functions of cognitive flexibility and conceptualization of this group was in a very low level and this may be result from mis-functionality of posterior-lateral cortex of frontal lobe which Wisconsin card sorting test is sensitive to it [**40**]. In explanation of this finding we can say that when human is resistant and flexible can cope with daily concerns, in this state inner strength can be inhibited to help the person get rid of caused concerns and challenges such as loss of profession, boredom expression, disaster rise or death of one of relatives. In the absence of flexibility, man is immersed in problems and following the created mental problems, one feels that he/she has been victimized and is under too much pressure and tries to deal with pathological mechanisms. As a matter of fact, the key part of flexibility is the ability to communicate with others to enlist their support. Flexibility makes protection against different mental health disease such as schizophrenia, depression and anxiety. Flexibility contributes to destruction of pathogens that increase the risk of mental health disorders, like lack of social support and previous stroke. If there is a disease, flexibility, improves ability. Patients with schizophrenia act very poorly in flexibility and this itself makes psychological dysfunction and lowers social support, therefore, social isolation occurs [**6]**.

Generally, the results of this study indicate that if patients are of higher flexibility, they can recognize individuals' facial emotions and the ability is efficient in their social interactions, and prevents disease and in case prevents its spreading. This study included limitations such as unavailability to all patients and selection less statistical samples, also selecting available patients, there is the possibility of errors in performing the test and unwillingness of some patients in performing the test which led to sample loss, also disability of some patients in speaking recorded possible responses. It is suggested that this research should be replicated in large-scale with many mentally ills and it is suggested that more accurate tests should be applied to assessing mental flexibility.

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