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SERUM ACETYLCHOLINESTERASE LEVEL IN THE PATIENTS OF OPIOID (BROWN SUGAR) DEPENDENCE

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The authors compared the serum acetylcholinesterase level in the patients of brown sugar dependence and the normal volunteers. Significantly lower level of serum acetylcholinesterase was found in patients of brown sugar dependence.

Opioid dependence is one of the major problems we are facing today. Even with the best of the availabe treatments, the relapse rate remains very high. While treating these patients over a period of last five years, it was noticed that most of these patients were very much aware about their problems and were genuinely interested in getting rid of the addiction. But inspite of this good motivation many of them would relapse within a short period of abstinence. Though the patients attributed the relapse to different reasons, it was found that the main reason for the relapse was the severe craving and the intense desire to consume the substance, which occurs during the initial withdrawal period and also during the subsequent abstinence period. If this craving can be controlled then even the relapse rate can be reduced.

As the various physical symptoms which occur during the withdrawal phase seem to have a biological basis, like altered levels of neurotransmitters and changes in the receptor density and sensitivity, it is likely that the mental symptoms of craving also have a similar biological basis. So in order to control the craving it is necessary to study the biological basis for this addiction.

In this direction various studies have been done and at present it is generally believed that increased noradrenergic activity plays a role in opioid withdrawal. Therefore usually attempts are made towards reducing noradrenergic activity during the withdrawal period to control the symptoms. The use of drug Clonidine (a presynaptic alpha-agonist) during withdrawal is based on the same principle.

If we take a look at the signs and symptoms which occur during the opioid withdrawal states, e.g. watering from the eyes and nose, pain in abdomen, diarrhoea and vomitting, bodyaches and joint pains, insomnia and yawning, piloerection (goose flash), and spontaneous ejaculation, it is evident that most of these symptoms can not be explained by increased noradrenergic activity.

These symptoms can either be explained by opioid receptor theory or by increased cholinergic activity during withdrawal. Since our body is basically controlled by sympathetic and parasympathetic nervous system, it is likely that even opioid system is finally medicated by one of these two symptoms only. From the above discussion it seems that it may not be the adrenergic activity but the cholinergic activity which plays a role in opioid withdrawal state.

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To study this hypothesis the ideal thing would have been to study the cerebrospinal fluid acetylcholine levels of the opioid dependence patients. This was not possible for us since the technique of estimating acetylcholine levels is relatively difficult and very expensive and also unless we have some supportive evidence for this hypothesis it is not advisable to do invasive procedures like lumber puncture to collect cerebrospinal fluid. The other alternative indirect method to study Acetylcholine function is to study blood acetylcholinesterase (true cholinesterase) levels. This is a relatively easy method and it may reflect central nervous system acetylcholine activity. After keeping in mind the limitation of the study, a pilot project was taken up to study the blood acetylcholinesterase levels in the opioid dependence patients.

MATERIAL AND METHOD

12 consecutive patients of opioid dependence (as per DSM-III-criteria) who were not on any medical treatment in the past one month were selected for the study. After the informed consent, 5ml. plain blood was collected within 12 hours of the last consumption of brown sugar. (i.e. just at the begining of the withdrawal).

For the control, 12 samples of 5ml. plain blood were obtained after the informed consent, from the volunteers who had come to the blood bank for blood donation. It was made sure that none of these volunteers were consuming brown sugar or opioids in any other forms.

A special proforma was prepared to collect the required demographic and phenomenological data of the patients and volunteers.

All the collected blood samples were analysed by colorimetric method (Ellman *et al.*, 1961), on auto analyser to determine serum acetylcholinesterase (E.C. 3.1.1.7) levels.

The collected data was then tabulated and statistically analysed using unpaired *t*-test and correlation coefficient.

RESULT

The index group had the mean ±SD age of 27.08±5.59 years, and the control group had 25.25±5.36 years. There was no significant difference between the two groups in their age ($t = 0.82$, $df = 22$, $p < 0.05$). All the patients in both the groups were males.

11 out of 12 patients were consuming brown sugar for more than two years and majority of them were consuming about 2 to 6 quarters of brown sugar per day. 7 out of 12 patients consumed it either by smoking or chasing, while 4 patients consumed it only by chasing and 1 patient, in addiction to these modes, used to take it parenterally. All of them used to take charas along with brown sugar while 5 of them took other substance also, like alcohol and sedative- hypnotic drugs. Out of these, for 5 of them it was the first attempts to give up their addiction, while the others had relapsed once or twice before and 1 patient had relapsed 3 times before.

The mean ±SD serum aacetylcholinesterase level of the patients in the index group was 1831±486.67 compared to 2528±400.15 in the control group. The index group had significantly lower serum acetylcholinesterase level as compared to control group ($t = 3.83$, $df = 22$, $p < 0.001$).

We did not find any correlation between serum acetylcholinesterase levels and either total duration of consumption ($r = 0.1874$, $df = 11$, $p > 0.05$) or average quantity of brown sugar consumed per day ($r = 0.2437$, $df = 11$ $p > 0.05$).

DISCUSSION

Lower serum acetylcholinesterase levels have been reported in patients of uraemia, shock, anaemia, tuberculosis, cancer, malnutrition and cachexia (Mclauchlan, 1988).

In our sample only 2 patients had tuberculosis and none had uraemia, shock or cancer. It is likely that due to chronic consumption of opioids they may have developed some degree of malnutrition which may be responsible for lower serum acetylcholinesterase levels.

Another factor which was common to all the patients was consumption of charas along with brown sugar and therefore it's contribution to the findings cannot be ruled out.

As opposed to the above mentioned conditions, the conditions in which there is increased sympathetic activity like thyrotoxicosis, hypertension, alcohol dependence etc. higher than the normal levels of serum actylcholinesterase have been reported (Mclauchlan, 1988). So our finding of lower serum acetylcholinesterase levels in patients ofopioid dependence suggests that it is very unlikely that increased adrenergic activity plays a role in opioid withdrawal. It is more likely that the increased cholinergic activity plays important role during opioid withdrawal, as lower acetylcholinesterase levels are associated with increased cholinergic activity.

It is likely that since total duration of consumption as well as average quantity of brown sugar consumed per day are crude parameters, we did not find any correlation between them and the serum acetylcholinesterase levels.

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