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MMPI SCORE CHANGES INDUCED BY LYSERGIC ACID DIETHYLAMIDE (LSD-25)[1]

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INTRODUCTION

Considerable interest has been shown recently in the action of Lysergic Acid Diethylamide (LSD-25), a semi-synthetic drug prepared from lysergic acid extracted from ergot of rye. This interest is due chiefly to the striking behavioral changes produced by extremely minute quantities of this drug (40-60 micrograms) when administered orally, and the reputed resemblance which these behavioral changes bear to schizophrenia. The LSD syndrome was first described by Stoll[5], whose observations have been subsequently confirmed by a number of other investigators on both normal and psychotic subjects[1, 4]. The syndrome is characterized by mood changes, feelings of unreality, feelings of depersonalization, perceptual distortions and visual hallucinations.

In general, those studies dealing with the effects of LSD on individuals with various personality disorders have utilized interview and observational data in an attempt to determine its diagnostic and therapeutic value. Projective techniques have been used to some extent in evaluating the psychological effects of this drug; however, data obtained with objective personality measures have been particularly lacking. In addition, few reports have appeared in which the conditions of drug administration have been rigidly defined or controlled. The present study was undertaken in order to investigate some of the psychological effects of LSD and to evaluate the Minnesota Multiphasic Personality Inventory (MMPI)[2] as an instrument for measuring changes produced by pharmaceutical agents.

[1]The present study was part of a comprehensive investigation on the effects of LSD-25; physiological and psychiatric aspects will be reported by Harris Isbell and associates.

Subjects and Procedure

Twenty-four former narcotic addicts volunteered for the study. All were prisoner patients serving sentences for violation of the Harrison Narcotic Act.[2] The experiment was carried out on a closed ward where the patients were observed constantly by specially trained attendants. A dayroom adjoining the ward was used as a testing room. The group form of the MMPI was administered under control (no drug), placebo, and LSD conditions, and only the standard instructions were given for completing the inventory. Each of the subjects received all three of the experimental conditions, with both the order and sequence completely counterbalanced. Subjects were randomly assigned to each of the six possible combinations of order and sequence. To allow for complete recovery from drug effects before the next treatment was given, the interval between any two treatments was never less than three days.

When the drug was administered, 50 to 130 micrograms of LSD were given orally to fasting subjects at 8:30 a. m. Since LSD is colorless, odorless and tasteless, water was used as a placebo, which also was given under fasting conditions and at the same time of day as LSD. Since maximal effects of the drug occur within two hours after administration and persist for three to six hours and occasionally longer, the MMPI was given at 10:00 a. m., one and one-half hours after the drug was ingested. Thus, most subjects completed the inventory in about two hours, during the height of drug action. Under control conditions, the subjects were not required to fast and no water was given, but the inventory was obtained under conditions that were otherwise the same as those for the other two administrations.

Each of the subjects had been given at least one dose of LSD prior to the experimental administration of the drug. This was necessary in order to determine the effective dose for each individual and also served to reduce the novelty of the drug experience. The appropriate dose was determined by various physiological measures and by observation of the patient's behavior. Although an attempt was made to produce approximately equal intoxication in all subjects, this was not always possible, since there is no *a priori* indicator of responsivity, and since considerable individual differences in response to the drug have been observed.

The MMPI records obtained under these conditions were scored on the four validity scales and nine clinical scales, with the addition of the Taylor Scale of Manifest Anxiety (A scale)[6]. The correction factor K was added. An analysis of variance, using a "treatments x subjects" design [3], was applied to the T-scores on each of the scales. Critical differences were calculated to test the significance of differences between means.

Results

Table 1 presents the mean T-scores obtained under control, placebo, and LSD conditions, as well as the over-all F-ratios for each scale. Significant variance, attributable to the effects of the experimental treatments, was found on the Psychasthenia and Schizophrenia scales at the .01 level of confidence, and on the Paranoia and Taylor Anxiety Scales at the .05 level. Mean squares for these scales are presented in Table 2. On each of these scales the difference between the LSD and control mean and also between the LSD and placebo mean exceeded the critical difference, whereas no significant differences were obtained between the control and placebo means. It is noteworthy that increased score elevation is limited to particular scales. In affecting specific scale changes rather than over-all elevations, confusion and misunderstanding of test items may be ruled out. Further evidence for this point is seen by inspection of the F-ratios for the validity scales, all of which were well within the limits of chance.

[2]The population from which the present sample was drawn has been described in terms of the most frequently obtained profile patterns on the MMPI. (Hill, H. E., Belleville, R. E., and Glaser, R. An Application of the MMPI to the Narcotic Drug Addict. To be published).

TABLE 1. MEAN MMPI T-SCORES OBTAINED UNDER CONTROL, PLACEBO AND LSD CONDITIONS, AND OVER-ALL F-RATIOS FOR EACH SCALE

Scales	Conditions			F-Ratio
	Control	Placebo	LSD-25	
?	50.00	50.00	50.00	0.00
L	52.79	53.63	52.63	1.72
F	55.63	55.79	58.33	2.63
K	57.50	54.71	56.00	2.94
Hs	55.58	56.79	59.96	1.89
D	61.79	64.54	63.04	1.47
Hy	56.04	55.96	57.88	1.26
Pd	70.54	70.58	61.75	0.47
Mf	57.08	56.71	58.29	0.92
Pa	49.75	50.00	54.42	5.03*
Pt	55.33	55.04	61.71	10.29**
Sc	57.25	56.42	65.67	9.70**
Ma	65.54	64.75	68.75	2.54
A	47.29	48.50	52.25	7.09*

**Significant at .01 level.
* Significant at .05 level.

TABLE 2. SUMMARY OF ANALYSIS OF VARIANCE

Source	df	Mean Squares			
		Pa	Pt	Sc	A
Treatments	2	165.39	340.68	628.39	160.43
Subjects	23	204.77	323.42	223.99	424.13
Treatments x Subjects	46	32.88	33.10	64.78	22.62
Total	71	92.30	135.81	132.23	156.57

DISCUSSION

Although it is customary for diagnostic purposes to interpret profiles individually in terms of patterns of score elevations, the present study was directed toward determining the effects of LSD which are common to most subjects, making it necessary to deal with mean scores. The differences between the means of scale scores under control and LSD conditions are interpreted here as reflecting an increase in the number of symptoms associated with particular diagnostic categories. The greatest increase following LSD was obtained on the Sc scale, which is not surprising, since this scale measures the extent to which patients deviate from conventional ways of thinking and reacting and since the LSD syndrome has been compared frequently with schizophrenia. Indeed, bizarre and unusual thoughts and overt behavior are the most striking features of the LSD psychosis. This is exemplified by depersonalization and distortion of the body or appendages which is frequently reported by patients under the influence of this drug.

Another prominent feature of the LSD syndrome is behavior characterized by greater suspiciousness, increased personal sensitivity, and intensified self-observation. Such behavior is reflected to some extent by the increase on the Pa scale. Although compulsive behavior was not observed in these subjects after LSD, the increase on the Pt scale can be accounted for by the frequently reported phobic experiences (fear of imminent death, fear of going insane, fear of bodily changes). The Taylor anxiety scale was also increased significantly; however, the amount of this increase did not seem to reflect the high degree of anxiety reported by or observed in these patients.

Although the increased T-scores obtained on these scales for LSD over those of the other conditions are not great, the differences are appreciable, especially since it is extremely difficult to induce short-term profile changes by experimental methods. Furthermore, because of the wide variability in response to LSD, many of the more

striking profile changes are obscured by the scores of relatively unresponsive subjects. Nevertheless, the results demonstrate that the MMPI is sensitive to some of the major personality changes induced by LSD. Since the MMPI was designed primarily as a diagnostic instrument it may prove valuable in clinical settings, e.g. in determining the specific effects of drugs on different individuals and in following the course and treatment when drugs are used as therapeutic agents. Although it is probably insensitive to many actions of drugs, it seems to tap a sufficient number of personality variables to provide considerable information on their psychological effects. In addition, it has the advantage of standardization on both normal and abnormal subjects, making possible comparisons between disorders which occur naturally and those which are experimentally produced.

Summary

This study was undertaken to investigate some of the psychological effects of Lysergic Acid Diethylamide (LSD-25) and to evaluate the MMPI as an instrument for measuring personality changes produced by pharmaceutical agents. Twenty-four former narcotic addicts were given the MMPI under control, placebo, and LSD conditions. Analysis of variance showed significant differences in T-scores between control and LSD conditions and between placebo and LSD conditions on the Pa, Pt, Sc and A scales. No significant placebo effects were found. The conclusion was drawn that the MMPI is sensitive to some of the major psychological changes produced by LSD-25, and the suggestion was made that this inventory could find wider use in clinical situations in which drugs are employed.

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