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Blink Rate in Psychiatric Illness

J. H. MACKINTOSH, R. KUMAR and T. KITAMURA

Summary: Twenty-three patients diagnosed as depressed and a matched group of normal subjects were interviewed on three occasions using standardised procedures. Their behaviour was quantified from video recordings. The results indicate that blink rate is increased in depression and falls to normal levels during treatment. The effect on blink rate was found to be independent of medication, but was related to the degree of improvement in the patients' condition. By contrast a sample of schizophrenic patients seen on one occasion showed a reduced blink rate which was probably a result of neuroleptic administration.

It has been reported on a number of occasions that alterations in blink rate are associated with various categories of mental illness (Riemer, 1955; Trethowan, 1973; Stevens, 1978; Karson, 1979).

Although our aim was to measure changes in a wide range of non-verbal behaviour during psychiatric treatment using methods similar to those of Grant (1965b, 1969) and Polsky and McGuire (1979), it was apparent at an early stage that effects on blinking were pronounced. These data were therefore extracted and are presented separately here.

Methods

Twenty-eight newly admitted depressed patients were classified using the Present State Examination (PSE) (Wing, Cooper and Sartorius, 1974). Using the computerised system of classification (Catego) nine patients showed endogenous depression with retardation, seven endogenous depression without retardation, seven depressive neurosis, and five were paranoid or schizophrenic with depressive symptoms (i.e. Catego major class R+, D+, N+, S+ respectively).

The patients were asked to attend for three interviews at fourteen day intervals. Twenty-three completed all three interviews, the remainder refused to attend or were discharged from the hospital after the first interview. The conditions in the laboratory, such as seating position, lighting, and the time of the interview, were the same on all occasions and the content of the interviews was standardized using the PSE schedule. On each occasion the Hamilton Rating Scale for Depression (Hamilton, 1960) was applied to assess the severity of depression.

Twenty-three non-psychiatric subjects matched, as far as possible, to the depressed patients for age, sex, race and socio-economic status, were similarly interviewed on three occasions. An unmatched sample of 20 chronic schizophrenic in-patients were interviewed once. The frequency of eye blinking was determined, using a push-button counter, from 15 minute video recorded samples of the interviews. The major observer (R.K.) was aware of the clinical condition of the subjects. However, a sample of 20 interviews was used to assess the repeatability of the count and this was examined by a second observer, blind to the diagnosis, to provide an estimate of inter-observer reliability. These tests yielded a correlation of 0.98 for repeated counts by the same observer and 0.87 for inter-observer comparisons.

Results

The results are shown in Table I.The depressed patients were found to blink more than the controls at the first interview, the difference was non-significant at the second interview, and by the third interview the blink rates of the two groups were virtually identical. This decrease in blink rate in the depressed patients over the treatment period was highly significant ($P < 0.001$) (Friedman's two way analysis of variance), whereas the non-psychiatric control group remained stable ($P = 07–0.8$). The change in blink rate in the patients was probably related to improvement in their clinical condition and this is confirmed, as when the group was divided by an independent assessor into "improved" ($N = 17$) and "unimproved" ($N = 6$), then the blink rate change was significant in the former ($P < 0.01$ to 0.001) but not in the latter ($P = 0.4$).

Comparison of the successsive interviews of the control group also revealed that individual blink rates remained constant ($P < 0.01$) (Kendall's co-efficient of concordance).

When the sub-categories of depression are examined (Table II) patients classified as suffering from endogenous depression without psychomotor retardation exhibited, on the first interview, a higher rate of blinking than either the endogenous depressives with psychomotor retardation or depressive neurotics. The patients were receiving a variety of drugs and in order to test for possible effects on blink rates the treatments have been classified into three groups: 1) Those receiving minor tranquillizers and 2) those given tri-cyclic anti-depressants and minor tranquillizers, and 3) a mixed group given major tranquillizers alone or in combination with tri-cyclic anti-depressants. The results shown in Table III reveal no significant differences between these categories.

Discussion

The results show that depressive illness is associated with an elevated blink rate which returns to normal levels as the patient's condition improves during treatment. The physiological mechanisms underlying this effect is not clear. One possibility is that it is an artifact of medication, and Karson (1979) showed that tri-cyclic anti-depressants can indeed lead to an increased blink rate. However, such an effect is unlikely to have contributed to the results reported here as, firstly no significant differences were found between the groups on different drug regimes and secondly, there were only minor changes in medication during treatment, whereas the blink altered profoundly. An alternative suggestion is that the rise in blink rate may represent tearfulness associated with the depressive mood; but overt crying was only seen once during the course of this study.

The differences between the sub-categories must clearly be investigated in a much larger population before definite conclusions can be drawn, but they may indicate an explanation of an apparent inconsistency between these results and Trethowan's (1973) description of a substantially reduced blink rate in depressed patients. His subjects were suffering from severe psychomotor retardation and the sub-group with the least increase in blink rate here was that categorized as endogenous depression with psychomotor retardation. Blink rate may, therefore, increase with depression, but reduce again as symptoms of psychomotor retardation appear.

A reduced blink rate, as compared with the controls, was also evident in our schizophrenic group. This is in marked contrast to previous reports (Karson, 1979; Karson *et al*, 1981; Stevens, 1978) which have

TABLE I

Blink rate in psychiatric patients

Subjects	Blink rate per minute 1st	2nd	3rd
Depressives	25.9[1] n = 28	21.3[2] n = 23	16.9[3] n = 23
Controls	15.2[1] n = 23	14.8[2] n = 23	15.1[3] n = 23
Schizophrenics	8.0 n = 20	—	—

1,1 Z = 2.57 P = 0.01 (two-tailed) (Mann-Witney U test)
2,2 Z = 1.59 P = 0.11 "
3,3 Z = 0.04 P = 0.96 "

TABLE II

Blink rate in sub-categories of depression

Sub-category of depression	n	Blink rate per minute 1st interview only
Endogenous without psychomotor retardation	7	29.0[1,2,3,4]
Endogenous with psychomotor retardation	9	20.2[1,5]
Neurotic	7	17.0[2,4,6]
Schizophrenics with depressive symptoms	5	43.0[3,5,6]

1,1 u = 12 P = 0.05 (Mann-Witney U test)
2,2 u = 6 P = 0.009 "
3,3 u = 8 P = 0.01 "
4,4 u = 27 N.S. "
5,5 u = 11 " "
6,6 u = 14 " "

TABLE III

Drug effects upon blink rate

Treatment	n	Blink rate per minute 1st interview only
Minor tranquillizers	11	24.3[1]
Tri-cyclic anti-depressants and minor tranquillizers	10	24.8[2]
Major tranquillizers and/or tri-cyclic anti-depressants	7	29.0[3]

1,2 u = 43 P = N.S. (Mann-Witney U test)
1,3 u = 34 P = N.S. "
2,3 u = 34 P = N.S. "

been demonstrated that schizophrenia is accompanied by an increase in blinking. In this case our results are likely to be due to a direct effect of drug administration as these authors also showed that neuroleptic drugs produce a reduction in blink rate. It is improbable that the discrepancy between the studies is the result of variation in observation or recording techniques as the control levels in this study and Karson's are identical and it may be, therefore, related to differences in dosage or type of neuroleptic.

The similarity of control blink rates in widely separated and independent studies, together with the result which showed that individual blink rate of the controls were constant throughout the trial, are evidence of the reproducibility of the recording techniques. Careful quantification of behavioural patterns can, therefore, provide information about a patient's progress which is relatively immune from subjective bias and may provide an additional tool for the clinician.

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J. H. Mackintosh, Ph.D., *Clinical Ethologist and Honorary Lecturer in Psychiatry, University of Birmingham, Uffculme and Charles Burns Clinic, Queensbridge Road, Birmingham*

R. Kumar, B.Sc., M.I.Biol., *Research Student, All Saints Hospital, Winson Green, Birmingham*

T. Kitamura, M.D., Ph.D., M.R.C.Psych., *Honorary Research Fellow, Department of Psychiatry, The Medical School, University of Birmingham*

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