The Effects of Pyrithioxine on the Behaviour and Intellectual Functioning of Learning-Disabled Children

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SUMMARY

A double-blind trial with pyrithioxine (Encephabol) and a placebo was made with 45 pairs of learning-disabled pupils, the pairs being equated in terms of certain variables. Both trial and control groups improved in reading and mechanical arithmetic over the 15-week period of the trial. The improvement was greater in the trial group, however, particularly in arithmetic.

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Underachievement in School

Both paediatricians and general practitioners are becoming increasingly aware of the large number of children brought to their rooms because of lack of progress at school. The results of conventional clinical examination are usually negative and, in the majority of cases, it is unjustifiable to conclude that the problem is psychogenic. Many of these pupils are hyperkinetics or children with epileptic-type EEG records. Considerable success is being experienced in such cases with stimulant and anticonvulsant medication. There are other cases, however, for whom little help seems presently available. These are generally the normal and happy children who seem to lack sufficient physical drive, who think too slowly and who do not retain enough mentally to keep up with their classmates—despite their normal intellectual potential. Some may respond to stimulant medication but many do not.

Action of Encephabol

Encephabol contains pyrithioxine, which has a chemical structure closely related to pyridoxine (vitamin B_6). However, its action is in no way similar to vitamin B_6. It has been shown that Encephabol has no vitamin or antivitamin action even in large doses. It is claimed that Encephabol improves the nutrition of the brain by influencing the blood-brain barrier. By economising on glucose utilisation it is claimed to act directly on an inadequate or disturbed energy metabolism, to improve the function of the cerebral nerve cells and, in this way, to create favourable conditions for an increase in psychomotor capacity. Encephabol has been shown to lead to improved absorption of glucose into the brain tissue by increasing the permeability of the blood-brain barrier.

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Purpose of the Present Trial

The purpose of the present trial was to evaluate the effect of Encephabol on pupils with learning disabilities by studying the differences in achievement and behaviour of two equivalent groups of pupils over an extended period, the one on Encephabol and the other on placebo. The choice of a double-blind trial rather than a cross-over trial was determined by two factors. In the first place, Encephabol requires between 6-8 weeks for its effects to be felt. Secondly, most of the measures used were of an educational nature where progress cannot be reflected at a uniform rate.

PATIENTS AND METHODS

Sample Group

The sample group was drawn from the Phoenix School in Durban, which caters for children with specific learning disabilities. Apart from this criterion, there are two others required for acceptance at the school—physical normality and normal intelligence. Since the Phoenix is a fee-paying school, children from the lower socio-economic levels are automatically excluded. The ratio of boys to girls at the school is 4 : 1. The total enrolment is 100, and 90 of these pupils were involved in the trial under discussion.

The method of grouping. As many pupils as possible were paired on the basis of 4 criteria; sex, chronological age, reading level and total intelligence quotient. These pairs of pupils were then divided at random into two groups of 45 each.

Measures Used

Two types of measure were used in order to reflect possible change in the pupils—objective tests and rating scales.

Objective tests. The following two objective tests were applied to all pupils at the beginning and at the end of the

trial: (i) the Burt Graded Vocabulary Test and (ii) the Logue Mechanical Arithmetic Test.

Rating scales. Three rating scales were drawn up especially for the trial for completion by parents, pupils and class-teachers. Parents and pupils completed their forms twice—at the beginning and at the end of the trial, while teachers completed their forms 5 times at evenly spaced intervals during the trial.

Medication

The complete supply of both Encephabol and placebo was received at the beginning of the trial, packed in 100-tablet bottles marked A and B, only the suppliers being aware of which was which. The identity of the Encephabol was, in fact, not disclosed until all the results had been collated and the statistics completed. In order to ensure that all medication was properly administered, no pills were given at the weekend when the children were at home. The 100-mg tablets were administered twice daily; at the start of school in the morning and at noon. The trial continued for 15 weeks and at no time were pupils, parents or staff made aware that a placebo as well as Encephabol was involved.

RESULTS

The results were obtained by comparison of the means for independent groups (*t*-test). It was unfortunately not possible to use the data from the rating scales in the statistical evaluation since none of the 3 rating scales provided relevant data. This can be explained by mistakes in method.

The intervals of time between the individual doses and the number of times when the rating scales were used (5 in all) involved a certain routine factor for those carrying out the assessment. This had an unfavourable effect on the rating in the sense of 'a bias of the central tendency' which is well known in methodology. This means that these data, which did not even differ from one assessment to the other, cannot be used.

The results of the objective measuring of the children's performance at school, carried out by means of the two well-tried tests, the Logue Mechanical Arithmetic Test and the Burt Graded Vocabulary Test, were much more relevant. These are set down in Table I. As far as reading scores are concerned, as might be expected in a school where the emphasis is on remedial reading, both trial and control groups improved significantly: both, in fact, at the 0,001 level of confidence. Inspection of the results does indicate, however, that the Encephabol group did better. As far as mechanical arithmetic is concerned, there was no significant improvement in the control group, but there was one at the 0,005 level of confidence in the Encephabol group.

TABLE I. OBJECTIVE MEASURING OF CHILDREN'S PERFORMANCE AT SCHOOL

		Means		
Performance	Group	Before	After	Gain
Logue Mechanical Arithmetic Test	**Encephabol**	**13,7**	**15,2**	**1,5**
	Placebo	**12,4**	**13,2**	**0,8**
Reading scale	**Encephabol**	**47,4**	**55,2**	**7,8**
	Placebo	**46,6**	**52,2**	**5,5**

DISCUSSION

Because of the nature of the Phoenix School, with its emphasis on remedial reading, it is natural to expect a significant average improvement in reading ability over a 15-week period. This causes a reading test to be a poor criterion with which to evaluate the effect of any second variable, be it sensory-motor training, psychotherapy or medication. Particular point is given to this conclusion when it is realised that, even in the trial group, the significance of the mean improvement was at the 0,001 level. For this reason, the matter of improvement in reading level should be excluded from further consideration here. Of far greater interest is the significant gain of the trial group in mechanical arithmetic in the face of no gain by the control group. Since there is no direct coaching in this skill at the Phoenix School, as there is in the case of reading, it can be accepted that the Encephabol was materially responsible for the improvement.

During the course of the trial, it became increasingly evident to one of us in daily contact with all the pupils, that at least 8 children in one of the groups were making great strides in many ways; drive, alertness and concentration were improving. After the experiment it was learnt that these 8 pupils were all in the trial group. This fact points to a basic weakness in such controlled trials of medication with learning-disabled children. No 2 children are alike in the nature of their difficulties which provides the criterion for their inclusion in such an experiment. It is therefore logical to expect that not all in the trial group are likely to benefit from the application of the given medication.

This leads to two conclusions. In the first place the significance of the medication on trial could be seriously affected by the large number in the trial group for whom it is not suitable. In the second place and in the field of learning disability, it cannot be accepted that a given medication, in this case Encephabol, will have a blanket usefulness for all. It thus calls for a closer study of learning-disabled pupils in an effort to isolate the types that are likely to benefit from any particular drug.