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How many children are affected by food additives? - a pilot trial

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Abstract:

OBJECTIVE: To determine the proportion of children affected behaviourally or physically by 56 common food additives. METHOD: Behaviour and health were rated for 49 children who avoided food additives for two weeks and for 46 children who continued with their normal diet. RESULTS: Rating 14 behavioural symptoms, teachers reported that 69% of all children improved at the end of two weeks; parents reported that 53% improved. For children able to show improvement, teachers reported that 89% improved; parents reported that 59% improved. Parents observed that at least 25% of all children improved in sleeping, headaches, stomach aches, rashes or bedwetting by avoiding food additives for two weeks in a normal school setting. CONCLUSION: More than half of school age children may be affected by common food additives. IMPLICATIONS: The appropriate educational and public health response would be to reduce the use of food additives that contribute to behavioural and physical disorders.

Objective:

The objective was to examine the claim made by Australian food regulators, without evidence, that only a small proportion of children are affected by food additives.[1] Recent UK research[2] points to higher numbers but because previous studies usually examined selected populations such as those with attention deficit hyperactivity disorder[3], there has been little or no research looking at the numbers of unselected primary school age children who are affected in behaviour or physical health by food additives. In an unpublished UK study that required an entire class to avoid 39 additives at home and at school for two weeks, 57% of parents reported an improvement in their child's behaviour and 56% recorded better sleep patterns and cooperation.[4]

Method:

In August 2007, 95 students aged 7-12 in five classes at Cooma North Primary School, New South Wales, Australia, undertook an additive-free trial. 49 participating children in three classes avoided 56 common food additives at school and at home for two weeks while 46 participating children in two classes acted as a control, not avoiding additives. The decision on which classes would act as control and which would avoid additives was made at the immediate outset of the trial, based on which classes had the majority of parental permissions to participate.

The 56 additives avoided were those shown to cause problems in previous work[5] namely

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COLOURS (102,104,107,110,122,123,124,127,128, 129,132,133,142,151,155, and natural colour 160b (annatto))

PRESERVATIVES (Sorbates 200, 201, 202, 203, Benzoates 210, 211, 212, 213, Sulphites 220, 221, 222, 223, 224, 225, 226, 227, 228, Nitrates 249, 250, Nitrites 251, 252 and Propionates 280, 281, 282, 283)

ANTIOXIDANTS (Gallates 310, 311, 312, TBHQ 319, BHA 320, and BHT 321)

FLAVOUR ENHANCERS (Glutamates including MSG 620, 621, 622, 623, 624, 625, Ribonucleotides 627, 631, 635 and Hydrolysed Vegetable Protein (HVP)

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Teachers rated control individuals, and both teachers and parents rated trial individuals, on a 1 (frequent) - 5 (not an issue) scale for 14 behavioural symptoms. The behavioural rating scale was based on that developed by Rowe and Rowe[6] but not scored according to their directions and included ratings of concentration, distraction, boredom, impatience, restlessness, impulsiveness, touchiness, noisiness and difficulty in controlling behaviour.

These 14 ratings were added together to provide two scores, one before and one after the trial, with their difference representing change in behaviour. The minimum score possible for an individual was 14 while the maximum was 70, thus a 4 point positive change was an improvement in behaviour of 7% assuming a linear response.

Children were similarly rated by parents for six physical symptoms: frequent headaches, stomach aches, or skin rashes; bedwetting or soiling; needs asthma medication; unhappy, anxious, depressed, or cries often; difficulty settling to

sleep; and night waking or night terrors. The minimum score possible was 6 while the maximum was 30, thus a 2 point positive change is an improvement in symptoms of 8%. There was no control scoring for physical symptoms.

In the week before the trial commenced, teachers and parents were given a two hour presentation and children were given a one hour presentation on food additives and how to read food labels. The trial commenced on a Monday morning with a free breakfast of additive-free food for the whole school and the school canteen also removed additives for the period of the trial. Although salicylates[5,7,8,9] were not actively avoided during this trial, examples of additive-free foods and recipes provided included lower salicylate alternatives such as water, unflavoured crackers and lower salicylate fruits rather than higher salicylate products such as fruit juice or dried fruit.[10] Therefore some avoidance of salicylates may have contributed towards the results obtained.

Results:

About 75% of those in the trial classes chose to participate and only four children dropped out during the trial. Withdrawal symptoms such as headaches, heightened irritability and sleep disturbance were obvious on days 4 and 5 and may have prompted these dropouts.

The results of the two control classes were aggregated for analysis, as were the results of the three trial classes, when it became obvious by crude statistical tests that there were no significant differences between these groups. Results are presented in Figures 1 and 2.

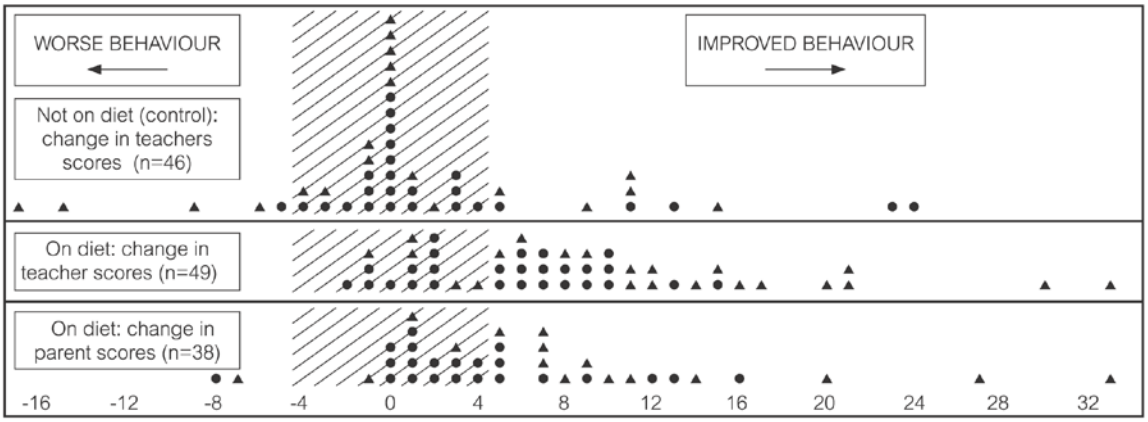

Figure 1. Change in behavioural scores by teachers and parents before and after a two week additive-free trial (● female ▲ male). Hatched area is an estimate of no observable change.

Teachers and parents were likely to report an improvement in an individual if the behavioural score change was more than 4. Parents reported a physical change if that score change was more than 2.

In the control classes, teachers found that 22% of children improved, with a behavioural score change of more than 4 points, while 9% became worse. 27 of 46 control children had an initial score of 65 or less and so were able to display an improvement. The removal of additives from the school canteen may partly account for the average improvement overall of 2 points in the second week of the trial, which confounds the trial observations. It was noteworthy that the control results showed a wide range of positive and negative behaviour, while the trial results have very limited negative behaviour.

In the trial classes, teachers reported that 69% of all children improved, with a behavioural score change of more than 4 at the end of two weeks, while parents reported that 53% improved on the same basis. The teachers saw no children become worse during the trial, while parents reported worse behaviour in two children.

Taking the 38 of 49 children with an initial score of 65 or less and thus able to display an improvement of more than 4 points, teachers reported that 89% improved and none became worse. Parents reported that 59% of the children with an initial score of 65 or less improved and two (6%) became worse. There was only one child with an initial behavioural score of 19 or less and so unable to display worse behavioural change. This child was parentally rated and recorded an improvement of 33 points.

The main behavioural symptoms in which improvements were seen were that children were calmer, concentrated better and were more cooperative.

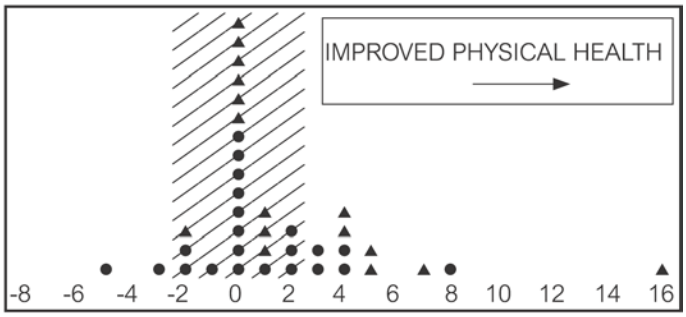

Figure 2. Change in physical health scores by parents before and after a two week additive-free trial (● female ▲ male). Hatched area is an estimate of no observable change.

Rating six physical symptoms, parents observed that 29% of all children improved, with a physical score change of more than 2, in sleeping, headaches, stomach aches, rashes or bedwetting by avoiding food additives while 2 (5%) became worse. Taking the 19 children with an initial score of 27 or less, who were therefore able to display an improvement of more than 2 points, parents reported that 58% improved and none became worse. There was only one child with an initial physical score of 9 or less and so unable to display worse physical change. This child recorded no improvement. The main physical symptom in which improvements were noted was sleeping.

Conclusion(s):

More than half of the children in this trial improved behaviourally if they avoided common food additives for just two weeks. Parents observed that at least 25% of children improved in sleeping, headaches, stomach aches, rashes or bedwetting by avoiding food additives.

Implications:

While the limitations of the trial design are recognised, results of this order have now been obtained at three different schools in NSW. The claim by food regulators that only “a small proportion” is affected is clearly not correct, nor is the claim backed by evidence. Reducing the use of food additives appears to be an effective method of improving classroom behaviour. Considering these results and those of the Southampton study, the appropriate public health and educational response would be to reduce the use of food additives that contribute to behavioural and physical disorders.[2]

Acknowledgments:

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