Gluten-free and casein-free diets in the treatment of autism spectrum disorders: a systematic review

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CRD summary

This review concluded that the evidence did not support use of gluten-free and/or casein-free diets in the treatment of ASD. The studies included in this review had very small sample sizes and were of poor quality. The authors' conclusions appear reliable in reflecting the limited evidence.

Authors' objectives

To investigate the effects of gluten-free and/or casein-free (GFCF) diets in the treatment of autism spectrum disorder (ASD).

Searching

English-language peer-reviewed studies were identified through a search of PsycINFO, Psychology and Behavioural Sciences Collection, ERIC and MEDLINE. Search terms were reported. Search dates were not reported (the authors stated that publication year was not restricted). Journals that had published studies selected for review were handsearched from 2008 to March 2009.

Study selection

Studies in people with ASD (including autism, Asperger's syndrome and pervasive developmental disorder not otherwise specified (PDD-NOS) that involved removal or reduction of consumption of gluten and/or casein in the diet were included. Studies were required to report outcomes related to amelioration of ASD symptoms (such as improved communication or emotional reciprocity). Studies were excluded if procedures were implemented without researcher oversight (such as parent description of intervention and results).

Most participants in included studies were diagnosed with autism (93%) and Asperger's syndrome. Most interventions included both gluten- and casein-free diets given for between four days and four years (mean 10 months). Some studies administered concurrent interventions. Most participants were male (67%). Age ranged from two to 17 years.

Two reviewers independently selected studies for inclusion. Disagreements were resolved through discussion

Assessment of study quality

Methodological quality was evaluated to assess level of certainty according to criteria of blinding, adequate inter-observer agreement and treatment fidelity measures (20% or more of sessions with 80% or better agreement), operationally defined dependent variables, enough detail to enable replication, limitations regarding controls against alternative explanations for treatment outcomes (such as maturation, concurrent interventions, problems with construct validity). Studies were classified as suggestive (included uncontrolled trials), preponderant (outcomes were assessed to be likely due to the intervention) and conclusive.

The authors did not state how many reviewers performed the validity assessment.

Data extraction

Data on behavioural or biomedical variables were extracted into standard data extraction forms. Behavioural variables included communication (such as nonverbal communication, vocalisations, question asking), stereotypy, play and challenging behaviour (such as pica, self-injury, aggression and property destruction). Biomedical variables included levels of urinary peptides, relevant enzymes and antibodies.

Results were coded as positive where all participants made improvements and there were statistically significant differences between groups, negative where none of the participants made improvements or if there were no

statistically significant differences between groups and mixed where some participants improved and others did not.

Percentage of non-overlapping data (PND) was calculated for single-subject designs. Repeated measures effect sizes were calculated for group designs. Repeated measures effect sizes were corrected for bias according to the technique developed by Hedges and Olkin.

One reviewer extracted data, which were checked by a second reviewer. Discrepancies were resolved through discussion.

Methods of synthesis

The studies were combined using a narrative synthesis supported by tables.

Results of the review

Fourteen studies (n=188) were included in the review. Sample sizes ranged from one to 50 participants. Overall study quality was poor; all studies that reported positive results were classified at the lowest level of certainty (suggestive). All studies at the second level (preponderant) reported negative results. None of the reviewed studies were assessed as conclusive. Seven studies reported positive results and four reported negative results, two reported mixed results and in one study the effect of the intervention could not be determined.

Quantitative summary of results was possible for four studies. Two of the three single-subject studies reported data. PND values were 0% and 3%.

Two of the nine group-design studies reported data for which repeated measures effect sizes could be estimated for several dependent variables. Diet treatments were observed to have effect sizes of -1.80, and -0.82 on participants' level of urinary peptides.

Authors' conclusions

Evidence did not support use of gluten-free and/or casein-free diets in the treatment of ASD.

CRD commentary

This review addressed a clear question supported by appropriate inclusion criteria. Relevant databases were searched. The restriction to English-language studies may have contributed to language bias. One database (ERIC) included unpublished studies. Publication bias was not considered in the report. Suitable methods to minimise risk of reviewer error and bias were reported for study selection and data extraction, but not for validity assessment. Results were pooled narratively supported by a table. A thorough discussion of potential biases and sources of heterogeneity was reported.

A basic (vote counting) synthesis was conducted, based on whether results were positive, negative or mixed. Details of study designs (such as number and type of groups) and results of individual studies were poorly reported for most studies and few numbers, confidence intervals or p-values were presented, which made it difficult to evaluate the individual results. However, it appeared clear that the studies had very small sample sizes and were of poor quality, so the authors' conclusions appear appropriate in reflecting the limited evidence.

Implications of the review for practice and research

Practice: The authors suggested that restrictive diets should be implemented only where a food allergy or intolerance was detected. The authors suggested that should a child with ASD experience acute behavioural changes seemingly associated with changes in diet, practitioners should consider testing the child for allergies and food intolerances and subsequently eliminate identified allergens and irritants from their environment.

Research: The authors suggested controlled trials to determine whether a GFCF diet had any additional therapeutic benefit for individual children with ASD.

Funding

Not stated.

Bibliographic details
Mulloy A, Lang R, O'Reilly M, Sigafoos J, Lancioni G, Rispoli M. Gluten-free and casein-free diets in the treatment of autism spectrum disorders: a systematic review. Research in Autism Spectrum Disorders 2010; 4(3): 328-339

DOI
10.1016/j.rasd.2009.10.008

Original Paper URL
http://dx.doi.org/10.1016/j.rasd.2009.10.008

Indexing Status
Subject indexing assigned by CRD

MeSH
Adolescent; Autistic Disorder /diet therapy; Caseins; Child; Complementary Therapies; Diet, Gluten-Free; Glutens; Humans

AccessionNumber
12010003744

Date bibliographic record published
14/07/2010

Date abstract record published
19/01/2011

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.