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Title Page

Title: Is a low-bacterial diet helpful in preventing infection in immunosuppressed children?

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Is a low-bacterial diet helpful in preventing infection in immunosuppressed children?

Scenario

A 7 year old child is being discharged home on oral immunosuppressants following a renal transplant. You routinely advise children in this situation to avoid foods such as unpasteurised cheeses and fresh pastries. You wonder whether this low-bacteria diet will actually prevent infection.

Structured Clinical Question

In a child on immunosuppressive therapy [Patient] does adherence to a low-bacteria diet [Intervention] compared to normal, unrestricted diet [Control] lead to reduced incidence of infection [Outcome] and whether these dietary restrictions lead to reduced quality of life and /or are acceptable to the patients [Secondary Outcomes].

Search Search date 26/09/2016

We searched the Cochrane library, PubMed, Web of Science, Scopus, Embase/OVID and CINAHL for the following terms:

("low bacterial diet" OR "low bacteria diet" OR "low microbial diet")
AND (immunosuppres* OR neutropeni*)
AND (sepsis OR infection)

We found 30 individual articles (77 including duplicates), of which 5 were relevant. These are summarised in table 1.

Summary

Citation	Country of study	Study group	Study type (level of evidence)	Duration of Intervention	Outcome	Key Result
Tramsen et al., 2016	Germany	339 children (168 males) being treated for AML	Large cohort study 2b	Duration of chemotherapy	Incidence of fever of unknown origin	No significant difference between restricted and unrestricted groups
					Incidence of gastroenteritis	No significant difference between restricted and unrestricted groups
					Incidence of pneumonia	No significant difference between restricted and unrestricted groups
					Incidence of	No significant

					bacteraemia	difference between restricted and unrestricted groups
Taggart et al., 2016	USA	35 children over 1 year of age, 16 of whom were male. All were post haematopoetic stem cell transplant	Small cohort study 3b	6 months	Infection rate (central line infections, norovirus infection)	No difference in norovirus levels. Central line infection levels were lower in the food-safety-based diet group than the neutropenic diet group.
					TPN days	No difference between groups.
					Quality of life	Reported to be lower in neutropenic diet group
Van Dalen et al., 2016	Systematic review – studies included from USA and the Netherlands	192 adults and children with various malignancies (age and sex not stated)	Systematic review of RCTs 1a	Not stated	Infection rate	No evidence of reduced infection rate in patients following low bacterial diet guidelines.
					Time to first febrile episode	No significant difference between groups
					Diet acceptability	No significant difference between groups
Moody et al., 2006	USA	19 children aged 1-18, 8 of whom were male. Diagnoses were ALL, sarcoma or brain tumour.	Small RCT 2b	Duration of study (up to 8 months)	Episodes of febrile neutropenia	No significant difference between groups
					Quality of life (determined by Peds QL Pediatric Quality of Life Inventory Core Module and Cancer Module)	No significant difference between groups
					Dietary acceptability	No significant difference between

						groups
Tabori et al., 2006	Canada	34 children aged 6-17 years, 16 of whom were male, who were being treated for ALL, brain tumour or other solid tumour	Small cohort study 3b	N/A – no intervention (study looked at 2 week camp period)	Episodes of fever Positive microbiology	4 children admitted to hospital with fever 1 child with positive virology for herpes (gingivostomatitis) and positive blood cultures for E.coli and S. aureus likely from central line

Table 1: Summary of included articles.

Commentary

We found one systematic review, one randomised control trial and three cohort studies (one large and two small) looking at the use of a low bacterial diet in preventing infection in immunosuppressed children. All of these studies looked at children who were immunosuppressed as a result of treatment for oncological conditions; we found no studies including children immunosuppressed for other reasons. There was significant heterogeneity between the ways studies measured infection, 4 studies reported on fever as an outcome. Tahori et al. and Tramsen et al. looked at episodes of fever, whilst Moody et al. looked specifically at episodes of febrile neutropenia. Van Dalen et al. looked at time to first febrile episode rather than total number of febrile episodes. 4 studies reported on confirmed infection, but in different ways. Tramsen et al. reported episodes of gastroenteritis, pneumonia and bacteraemia separately. Taggart et al. reported norovirus and central line infections only. Van Dalen et al. reported overall infection rate. Tabori et al. reported only positive microbiology. No study reported a significant difference in infection rates between groups following the low bacterial diet and those following standard food safety advice.

Further, large randomised control trials are required to evaluate the usefulness of the low bacterial diet as an infection prevention measure in immunosuppressed children.

Both Taggart et al. and Moody et al. reported on quality of life in children following the low bacterial diet. Moody et al. evaluated this using a validated questionnaire (Peds QL Pediatric Quality of Life Inventory Core Module and Cancer Module). Taggart et al. state that they used a survey in their study, but do not give further details of how quality of life was assessed.

Moody et al report on dietary acceptability, which was also evaluated in the systematic review by Van Dalen et al. Dietary acceptability was measured by a

qualitative interview for patients and parents at the end of the study. There was no significant difference identified between the groups for the adherence to the diets. This result may be limited, however, by the small sample size of this study and the potential for recall bias. Given the importance of adequate nutrition in children who are immunosuppressed for any reason, it would be important for future studies to also focus on this issue. It may be that large cohort studies, rather than randomised controlled trials, are better placed to investigate issues of palatability and quality of life.

Given the lack of supporting evidence, the benefits of following a low bacterial diet should be balanced against ensuring immunosuppressed children are able to maintain good nutritional status with a palatable, varied diet.

Clinical bottom lines

1. Following a low bacterial diet does not result in a decreased risk of infection (Grade B)
2. Following a low bacterial diet decreases quality of life (Grade C)
3. There is insufficient evidence to comment on the palatability of a low bacterial diet

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