

# Potential benefits of probiotics – main findings of an in-depth review

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There is much confusion about whether probiotics work or not and this is not surprising as reports in the media are often conflicting. Media articles are often based on single studies, which do not reflect the whole body of evidence on probiotics. Therefore, the British Nutrition Foundation carried out a review to analyse the evidence available so far and to give a clearer picture of the potential health benefits of probiotics. In this review, more than 100 meta-analyses, systematic reviews and original articles have been included (Weichselbaum, 2009). Some of the major findings will be presented and discussed in this article, focusing on topics that may be relevant for health professionals working in community nursing.

## Definition of probiotics

The Food and Agricultural Organization of the United Nations and the World Health Organization (WHO) define probiotics as live microorganisms – mostly bacteria – which when taken in adequate amounts confer a health benefit (WHO, 2002). To provide a potential benefit, probiotics must survive the harsh conditions of the intestinal passage to influence the microflora of the targeted location in the body, which is in most cases the intestinal tract. A suf-

ficient amount of bacteria must survive and reach the gut to influence its microflora, and probiotics need to be taken regularly as they do not become established members of the gut flora, unless being taken continuously.

The term probiotics comprises a large number of bacteria and other microorganisms, such as yeast, and each probiotic strain acts in a specific way. Therefore, when a certain health benefit has been established for one strain, this does not mean that all probiotics can confer this health benefit. Each strain has to be tested for a certain effect separately, and also the end product through which the probiotics are being delivered (e.g. dairy product, capsule) should be tested to see if the provided strain maintains its properties. As probiotics work in a strain-specific manner, it is actually misleading to speak about ‘probiotics’ in general when it comes to a specific health benefit – this would be like speaking about health benefits of pills in general, rather than describing which pill works for which health issue.

## What the evidence says Constipation

Although constipation affects all age groups it is a particular concern in older people, particularly in those with chronic illness and those who live in nursing homes. Acute bouts of constipation can occur because of illness or dietary alterations, whereas the onset of chronic constipation usually occurs earlier in life and often deteriorates with age. The symptom experience can range from a mild, acute event that is remedied with a shift in fluid and dietary intake to a chronic condition that requires daily interventions with mixed results (McCrea et al, 2008).

## ABSTRACT

Media reports on probiotics have been conflicting which has led to increased confusion among the general population and also among health professionals. To disentangle myths and reality, the British Nutrition Foundation has carried out a review on probiotics and health. There is good evidence that probiotics are effective in preventing antibiotic-associated diarrhoea and, although only few studies have been carried out so far, probiotic microorganisms also seem to have the potential to prevent the potentially fatal *Clostridium difficile*-associated diarrhoea. A limited number of studies that are available on the effectiveness of probiotics on constipation have shown conflicting results, but promising results have been found for certain strains. Irritable bowel syndrome symptoms have been found to be reduced by consuming probiotic strains, although a high placebo effect has been observed in some of the studies. The field of probiotics is relatively new and more studies will be needed to allow firm conclusions on the effectiveness of probiotic microorganisms for certain health issues.

## KEY WORDS

Probiotics ♦ Gut flora ♦ Constipation ♦ Irritable bowel syndrome ♦ Diarrhoea



It has been assumed that probiotic microorganisms may have the potential to alleviate constipation by changing the gut flora. Only limited studies examining the effect of probiotics on constipation have been carried out so far and the existing studies used different strains. Although evidence is conflicting the findings are promising for some strains. In a study in children under 10 years of age with chronic constipation the efficacy of *Lactobacillus casei rhamnosus* Lcr35 was compared with the traditional laxative magnesium oxide and a placebo. At the end of the study those receiving probiotics had a similar defecation frequency as those receiving the traditional laxative, and in both groups defecation frequency was significantly higher than in the placebo group. Further, the treatment groups also showed significantly less hard stools compared to the placebo group (Bu et al, 2007). A study in adults with chronic constipation showed that *Lactobacillus casei* Shirota was successful in improving gastrointestinal symptoms. There was a significant decrease in the occurrence of severe or moderately severe constipation in the probiotics group (from 95% to 34%) within 4 weeks of treatment, but no significant changes were found in the placebo group. This effect became apparent from the second week of treatment (Koebnick et al, 2003). *Lactobacillus rhamnosus* GG has so far failed to show a significant effect on constipation (Banaszkiewicz and Szajewska, 2005; Hongisto et al, 2006).

### Irritable bowel syndrome

Irritable bowel syndrome (IBS) is a chronic condition that is characterized by altered bowel habits (diarrhoea and/or constipation), abdominal pain and other gastrointestinal symptoms including bloating and flatulence in the absence of structural abnormalities in the intestine. It is thought that an over growth of the gut bacteria, among other factors, plays a role in IBS and that therefore probiotics may be effective in alleviating symptoms of this unpleasant condition. The potential of probiotics for use in symptom relief is particularly welcome as there is no adequate treatment available at the moment. Although IBS patients commonly present with IBS between the ages of 30 and 50 years, a study by Agrawal et al (2009) showed that IBS is under-recognized in elderly care. About a fifth of patients attending an elderly care clinic were found to have symptoms suggestive of IBS (Agrawal et al, 2009).

The current evidence on the effectiveness of probiotics in alleviating IBS symptoms seems promising, but evidence to make firm conclusions about individual probiotic strains is lacking so far. Also, a high placebo effect has been found in some studies, which could be attributed to the fact that assessment of IBS mostly relies on subjective estimations of symptoms. To make firm conclusions further studies, if possible with more objective end points, are needed (Weichselbaum, 2009).

### Antibiotic-associated diarrhoea

Antibiotics are used to kill off harmful bacteria that cause infections in the human body. Unfortunately, the good

bacteria in the gut are often also killed as well, which can lead to antibiotic-associated diarrhoea (AAD). A severe form of AAD is caused by *Clostridium difficile*, a harmful bacterium that is common in clinical settings. Advanced age is one of the risk factors for developing *C. difficile*-associated diarrhoea (CDAD) during antibiotic treatment and intensive care unit patients with CDAD have a high mortality (Zilberberg et al, 2009).

AAD is one of the best established areas in probiotics research. Two strains, *Saccharomyces boulardii* and *L. rhamnosus* GG, are the most studied strains and have been found effective in lowering the risk of AAD by about two thirds (Weichselbaum, 2009). There are only few large-scale studies on the effects of probiotic strains on CDAD. Two studies, however, have found promising results. A significant effect on CDAD occurrence has been found for *Lactobacillus casei* DN-114 001 (*L. casei* imunitass) in a placebo-controlled blinded study (Hickson et al, 2007) and a significant effect has also been observed for the strain *Lactobacillus casei* Shirota in an unblinded study (Stockenhuber et al, 2008).

### Immune system

The immune system is highly complex with various biological processes involved, and various factors influencing its efficacy. During human ageing, a diminution of immune response occurs, leaving elderly more prone to infections (Pfister and Savino, 2008). Probiotics have been suggested to not only increase the immune defence in the gut but it has also been suggested that probiotics could have a broader impact on the body's entire immune system. In the review on probiotics and health by Weichselbaum (2009), the focus was put on common cold and flu infections. So far, a limited number of probiotic strains have been studied in terms of their effects on common cold episodes. Some of the studies have shown promising results, but most of them failed to reach statistical significance, possibly owing to small sample sizes. The evidence so far does not suggest that probiotics can prevent common cold episodes, but some suggest that certain strains may reduce the duration and severity of symptoms (*Lactobacillus casei* DN-144 001 and a mix of *Lactobacillus gasseri* PA16/8, *Bifidobacterium longum* SP 07/3 and *Bifidobacterium bifidum* MF20/5). Probiotics may help fight off common cold episodes more quickly, but more studies will be needed to confirm these findings (Weichselbaum, 2009).

## Conclusions and implications for community nursing

Evidence on the effectiveness of certain probiotic microorganisms seems promising for some health outcomes, some of which may be particularly relevant for elderly. Many elderly suffer from constipation, and although the evidence so far is rather limited, it looks promising for some strains. IBS symptoms also seem to be relatively frequent, as shown in a recent study (Agrawal et al, 2009), and here again studies on certain probiotic strains have delivered promising results. Even though firm conclusions on the effectiveness of pro-

## KEY POINTS

- ◆ Probiotics comprise a large number of bacteria and other microorganisms and they work in a strain-specific manner, so it is necessary to consider a probiotic strain's effect on health rather than the effect of probiotics in general
- ◆ Some probiotic strains seem to have the potential to alleviate constipation and symptoms of irritable bowel syndrome, but more studies are needed
- ◆ There is good evidence that certain probiotic strains can prevent antibiotic-associated diarrhoea and there are promising results for a preventive effect on *Clostridium difficile*-associated diarrhoea

Probiotics on constipation or IBS cannot be made at this stage, probiotics seem to be safe to use and so it may be worth patients trying them out. Complications have, however, been reported in some patients following the use of probiotics, such as the immunocompromised, those with severe underlying illness (e.g. gastrointestinal or hepatic cancer) or in the intensive care setting Pham et al, 2008). They should only be taken under medical supervision in such cases. The National Institute of Clinical Excellence (NICE) suggested in their IBS guidelines that people with IBS who choose to try probiotics should be advised to take the product for at least 4 weeks while monitoring the effect and they should be taken at the dose recommended by the manufacturer (NICE, 2008). There is good evidence that some probiotic strains can decrease the incidence of AAD and a few studies also showed that probiotic microorganisms also have the potential to protect against CDAD, a potentially fatal condition, particularly in the elderly. Although at this stage for most health issues more studies will have to be carried out to make any firm conclusions about the effectiveness of probiotic strains, it is important to remember that the field of probiotics is, in scientific terms, a rather new one and we are at the moment still at a relatively early stage. Many studies are currently carried out and there will be many more, and in a few years time we will have a clearer picture on how probiotics work and in which health conditions they are effective. At the moment it seems, that elderly people in particular may profit from taking probiotic microorganisms, considering they are more prone to illness than younger people. However, at present there are no official recommendations on the use of probiotics, only NICE give advice on their use in its guidelines for IBS (NICE, 2008).

Probiotics are mainly available in the form of dairy products or as supplements. The form in which they are taken is likely to depend on personal preference. However, it is important that the bacterial strain is clearly specified (e.g. 'contains *L. rhamnosus* GG' rather than 'contains *Lactobacillus* strains' or 'contains probiotic bacteria') and that the probiotic product has been tested for its efficacy. This is, however, not always traceable.

Altogether, although the field of probiotics is still in its early stages, evidence so far seems promising and it will be exciting to see how research on probiotics will develop in the coming years.

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