



Consumer demographics and expectations of probiotic therapy in New Zealand: results of a large telephone survey

Michael Schultz, Achmed Baranchi, Lynda Thurston, Yu Ching Yu, Lily Wang, Jonathan Chen, Mark Sapsford, Joseph Chung, Maysa Binsadiq, Lauren Craig, Ben Wilkins, Dave McBride, Peter Herbison

Abstract

Background Knowledge regarding the possible health benefits of probiotic preparations has been increasing, but clinical trials have largely produced non-significant results. In contrast, the open market for probiotics is expanding worldwide despite little research of consumer characteristics.

Aim We aimed to survey the availability of probiotic preparations, the recommendation patterns of general practitioners (GP) and the characteristics of consumers.

Methods Pharmacies were visited and the types of probiotic supplements were reviewed. A telephone survey was conducted to identify and characterise users and non-users. A questionnaire was sent to GPs.

Results We found 31 probiotic products containing 16 different strains of bacteria. The majority of GPs were unable to clearly define a probiotic. Of 1512 random phone numbers called, 873 were answered. The prevalence of probiotic use was 25.4% of respondents. More females than males had ever used probiotics (30.6% vs 17.2%; $p < 0.0001$). The highest rate of use was found in those with tertiary qualifications (34.2%; $p < 0.001$). Of users, 75.2% said they had used probiotics on a recommendation, 80.5% of non-users said they would consider taking a probiotic if it was recommended by the GP. Probiotics were mainly used alongside antibiotic treatment (23%) and gastrointestinal disorders (27.5%). Significantly more users than non-users believed in the benefits of probiotic without concern for possible side effects.

Conclusion The majority of participants would consider taking a probiotic if it was recommended by their GP, but GPs exhibited a lack of knowledge in the use and indications for probiotic therapy. There was a general lack of concern regarding potential side-effects.

The health potential of probiotic bacteria was first recognised by Elias Metchnikoff in 1907¹ but only recently has probiotic therapy gained wider acceptance. In most countries, probiotic products are classified as foods or food supplements and are freely available through supermarkets, pharmacies, health stores and on the internet. Despite a lack of clinical trials, probiotics have been reported to be efficacious in patients suffering from a wide spectrum of mainly gastrointestinal diseases and atopic disorders.

While there is considerable discrepancy across legislations², the lack of valid efficacy data, but more so the classification as a food supplement, prohibits the manufacturer from making specific health claims about any product on the product packaging, but some are known to do so indirectly either on web sites or promotional material³.

While generally regarded as safe, reports of serious, even fatal, adverse effects and drug interactions are beginning to appear in the literature.^{4,5} Despite these facts, the probiotic market is lucrative and fast growing. Californian market researcher, Global Industry Analysts, predicts the functional food and beverage market will reach US\$109bn by 2010 with the United States being the largest single domestic market followed by Europe and Japan. (Changing lifestyles drive functional food growth by Clarisse Douaud, 25-Jul-2007, <http://www.foodnavigator-usa.com/Financial-Industry/Changing-lifestyles-drive-functional-food-growth>.)

Recent data state that in New Zealand, approximately \$US 4.3 million/year is spent on probiotics, compared to Japan with \$US29.7 million and Sweden with \$US6.5 million

(http://www.datamonitor.com/store/Product/opportunities_in_digestive_immunity_health_consumer_attitudes_behaviors?productid=DMCM4663, accessed through Fonterra, NZ).

While most research is directed toward understanding of mechanisms by which probiotic organisms mediate their beneficial effects, there is little data either on what influences consumers to use probiotics or what they expect of them. It has been suggested that the consumption of fermented milk is closely linked to the acceptance of probiotic products. In this regard, Finland is leading with 183.9 L per capita consumption of liquid milk drinks compared to New Zealand with 90 L (Professor Douglas Goff, Dairy Science and Technology Education, University of Guelph, Canada, www.foodsci.uoguelph.ca/dairyedu/home.html, assessed 18/02/09).

New Zealand is a mostly rural country with a growing dairy industry but there is no data on the availability of probiotics, why people decide to use them and what they expect them to do. Our survey was conducted in Dunedin, an urban centre in Southern New Zealand. The aim was to describe the availability of probiotic products, identify the health claims attributed to them, and find out who recommends them and why they are used.

Methods

We carried out an omnibus survey of pharmacies, retail shops and general practitioners and a random cross sectional telephone survey of households. The study was approved by the chairperson of the Lower Regional South Ethics Committee.

Probiotic availability and related health claims—Pharmacies and Health Food Shops within a 10km radius of the city centre were identified through the phonebook and were visited individually. Product ingredients and health claims were obtained from the products' packaging, pamphlets and official manufacturers' websites.

Survey questionnaire to general practitioners—General practitioners (GP) within a 10km radius of the city centre were identified through the phonebook. A one-page survey questionnaire was compiled and posted, investigating their overall knowledge on probiotic therapy and also if, and why, they recommended them to patients.

Telephone survey of households—The Dunedin white pages were used to randomly select households to be included in the study. To ensure randomisation within households, each phone call requested that

the respondents should be the person in the household at the time was over 18 and with the next birthday.

A computer assisted questionnaire was designed to answer the main aims of identifying respondent demographics, with the prevalence and reasons for use of probiotics.

The sample size of 1500 was selected based on the estimation of probiotic use in the general population of 5%, assuming a 66% response rate and in order to estimate the prevalence with a confidence interval (CI) of $\pm 3\%$.

Data collection—The telephone survey was conducted over three weeks in March 2008. The calls were made between 5pm and 8:30pm over all seven days of the week, and each number was tried three times in case of no answer. Anonymity was maintained for analysis by not recording any names at any time and assigning to each subject a study number. Each subject was asked to provide basic demographics such as age, sex, ethnicity and highest qualification. The address of each study subject was matched with a New Zealand Deprivation score (NZDep score) to determine socio-economic status.

Data analysis—SPSS (v16, SPSS Inc., Chicago, IL, USA) software was used to carry out descriptive data analyses and perform the appropriate parametric and non-parametric inferential tests.

Results

Probiotic availability in Dunedin and related health claims—The products in 22 out of 25 pharmacies and 4 out of 5 health food stores were reviewed. 31 products contained 16 different strains either alone or in combination, mostly lactobacilli and bifidobacteria. Neither specific bacterial strains nor their numbers in the formulation were mentioned on packaging. 29 different health claims were made, mainly regarding the gastrointestinal system and restoration of normal bowel flora, but with references to immunity and even cancer. In line with legislation, claims on packages were, in general, nonspecific however information supplied through pamphlets or on websites did contain specific health claims (e.g. reduction of sick days by 55%).

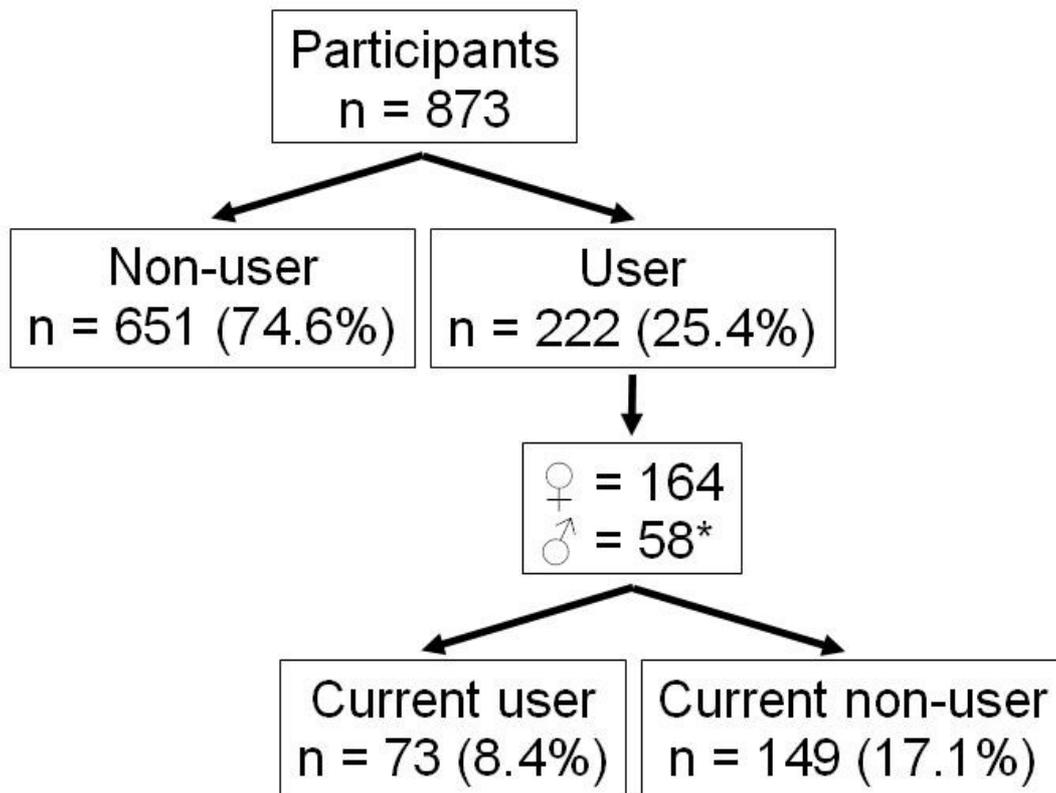
Survey of recommendation pattern by general practitioners—Of 110 GPs approached by mail, 45 returned the completed survey questionnaire. Only 9% of GPs were able to define the term “probiotic” and only 3.3 recommendations for probiotic supplementation were made by GPs during the previous 6 months. Probiotic products were recommended for diarrhoea (44.4%), oral health (24.4%), post antibiotic therapy (22.2%), Irritable Bowel Syndrome (IBS; 20%), Inflammatory Bowel Disease (IBD; 17.8%), immunity (15.6%), halitosis (13.3%), urinary tract infections (UTI; 13.3%), constipation (11.1%) and allergies (2.2%).

Telephone survey—1512 phone numbers were randomly selected and called. Of these, 107 had been disconnected and there were 177 “no answers” leaving 1228 eligible numbers. Three hundred and ten individuals declined the survey, leaving 873 participants (74% of called numbers) in the survey. Of those >97% completed the survey in full, answering every question.

Overall demographics of participants—The range of participants’ ages was 18 to 93 with a mean age of 52.2 years. 61.4% of participants were female. 73.8% of participants identified themselves as New Zealand European. The next most common ethnicity was Other-New Zealander (15.8%) and 4.4% Europeans, 2.2% Asian, 1.8% Maori and 0.9% Pacific Islanders participated. Four participants did not specify their ethnicity. 45.2% of participants had a tertiary degree and 18.6% had no qualification. 4 participants did not answer this question. Participating households were evenly distributed among the NZDep score.

Prevalence of probiotic use—Of the 873 participants in the survey, 25.4% (95% C.I. 22.6-28.5) have ever used probiotics but there are far less ‘current users’ with 8.4% (95% C.I. 6.6-10.4) of people having used probiotics in the last 7 days (Figure 1). Most users (19.1%) preferred yoghurt formulations containing probiotics and 5.8% currently consume yoghurts.

Figure 1. Prevalence of probiotic use in Dunedin, New Zealand



Demographics of users—Significantly more females (30.6%) than males (17.2 %) have ever used probiotics ($p < 0.0001$) and users were significantly younger than non-users (mean age 49.3 years vs. 53.2 years; $p < 0.001$). Analysis indicated an overall significant difference in ethnicity and probiotic use ($p = 0.015$). Those identifying as European (excluding NZ European) had the highest rates of probiotic use at 42.1% compared with the overall usage rate of 25.4%. Although there was only a small sample size, no Pacific Islanders had ever used probiotics. Analysis showed an omnibus significant difference ($p = 0.001$) in education level and use of probiotics.

The highest rate of use was found in those with tertiary degrees (34.2%) compared to those with no qualifications (13.0%). In contrast, the study showed no significant trend between rates of probiotic use and ordered NZDep01 scores ($p = 0.932$). The rates of probiotic use do vary from 29.9% in NZDep01 “6” to 17.2% in NZDep01 “10,” this was not statistically significant ($p = 0.932$).

Recommendation pattern—75.2% of patients used probiotic products upon recommendation, mainly by media, the family doctor or family members (Table 1). Of the 651 non-users, 80.5% stated that they would consider taking probiotics if a doctor recommended they should, compared to 10.3% who showed no interest. Just under half (49.2%) of non-users would take probiotics if a pharmacist recommended that they do. Of the non-users, 38.6% stated no indication for probiotic treatment and 26.1% had never heard of probiotics. Only 0.9% were worried about side effects.

Table 1. Main source of recommendation for users of probiotics

Source of recommendation	Number of users	Percentage of users
Not recommended	55	24.8
Doctor	38	17.1
Family	24	10.8
Friend	22	9.9
Health shop	5	2.3
Lecturer	4	1.8
Media	48	21.6
Naturopath	2	0.9
Nurse	4	1.8
Other	3	1.4
Pharmacist	17	7.7
Total	222	100.0

Perception of probiotic treatment—Users reported a wide range of indications for probiotic use. The most common indication was following a course of antibiotics (23%). Other common uses included other gastrointestinal disorders (10.4% for GI balance and 17.1% for GI upset) and throat and oral health. Some of the more innovative answers included using probiotics for musculoskeletal purposes, to prevent bowel cancer and to lose weight. 9.9% did not know of any conceivable benefit of probiotic supplementation and 2.7% stated that there are no benefits.

Perceived benefits were analysed for both users and non-users (Table 2).

Table 2. Perceived benefits of probiotic products

Benefit	Non-user	User
No response	0.0%	0.5%
Don't know	61.1%	9.9%
No benefit	2.6%	2.7%
Gastrointestinal tract	16.4%	45.1%
General health	9.7%	13.1%
Immunity	2.5%	5.9%
Musculoskeletal	0.5%	0.0%
Post antibiotic therapy	2.2%	9.9%
Energy	0.8%	0.5%
Supplement	0.9%	0.0%
Throat/oral	1.2%	4.5%
Urogenital	1.1%	6.3%
Weight loss	0.6%	0.0%

61.1% of non-users did not know of any benefits but 2.6% stated that there are no benefits. Most common perceived benefits were an improvement of the gastrointestinal balance and the general health status. The omnibus P-value (<0.001) demonstrates that there is a significant difference between the user and the non-user groups' beliefs regarding the benefits of probiotics.

The majority of users (67.1%) and non-users (89.4%) were not aware of any side effects by probiotic treatment and 22.5% of users stated that there are no side effects compared to 5.7% non-users. The omnibus P-value (<0.000) shows that the beliefs of the user and the non-user groups differ significantly with regard to potential side effects.

Other characteristics of probiotic users—In our study, a question was also asked with regards to other non-prescription health supplements use. Among the survey respondents, the rate of use of non-prescription health supplements in Dunedin is 45.8%. There is a significant correlation between the use of non-prescription health supplements and probiotic use with 68.5% of users currently taking other supplements, compared with only 38.1% of non-users ($p<0.001$).

Participants were also asked how much control they have over their own health. Answers were given according to a scale from 1 to 10 with 1 representing no control and 10 representing full control. The mean value for all participants was 7.55, with a user mean of 7.62 and non-user mean of 7.52 ($p=0.504$). However, an omnibus p-value demonstrates a difference between in the responses of users and non-users in favour of users ($p=0.041$).

Discussion

The liberal interpretation of beneficial effects in marketing strategies has forced legislation to regulate labelling. However, this is being done inconsistently throughout the world and Internet information crosses borders.

In Japan, a country with a long tradition in probiotic therapy (e.g. Yakult, a fermented milk drink containing *Lactobacillus casei* Shirota bacteria), more than 20 health claims are approved in contrast to Canada where no health claim can be legally linked with a probiotic product.⁶ This leaves the consumer confused when asking for guidance from authorities such as family practitioners and pharmacists. Our study is the first large analysis of probiotic availability in Australasia and an extensive characterisation of probiotic consumers.

One-quarter (25.4%) or 222 of the 873 participants in the telephone survey had ever used probiotics, with 73 (8.4%) having used them in the past week. Females under 50 years of age, of European ethnicity, and possessing a tertiary degree were more likely to be consumers. The most common formulation “ever” used was yoghurt, with a smaller proportion of people using capsules, but only 6% of respondents had used yoghurt and 1.5% tablets or capsules in the past week.

The majority of consumers had been recommended to use probiotic supplements, most frequently by the media, but also commonly by doctors and friends, with 80% of non-users saying that they would use probiotics if recommended by a doctor,

compared to just under half who would do so on a pharmacist's recommendation. Many people would take probiotics if their GP recommended it, but we found that practitioners' knowledge of probiotics was limited.

The main indications for use were post-antibiotic therapy, other GI conditions and for "general health". Non users had either not heard of probiotics, or did not see a need for them. They were also less likely than users to have heard either of benefits or side effects.

The strengths of the study were the large sample size, the random nature of the sampling and the 74% response rate, which was good for a telephone survey.

Weaknesses lay in the source population being limited to households having a telephone, being listed in the telephone book and fulfilling the inclusion criteria. Compared to Dunedin census values, responders were older (54 vs 34) and had a higher ratio of females to males, 61%:39% compared to census values of 52%:38%.

Women seem more likely to be at home and answer the phone at the time of the survey, which may have increased the overall prevalence estimate. The fact that a limited number of Māori and Pacific Island peoples were included may also limit generalisability to the rest of New Zealand, with a similar overestimate of prevalence.

There were few similar studies conducted overseas, mostly of smaller sample size. The results of this study do compare with those of four overseas studies, in that probiotic users are more likely to be female,⁷ educated,^{7,8} use other non-prescription supplements,⁸ and of European origin.⁹ However, compared to overseas data, our study showed probiotic users to be younger and we found no association between income and use.

Consumers who are aware of probiotics tend to be more accepting of their potential benefits.¹⁰ Attitudes toward probiotics range from knowledgeable and believing, to unaware and even repulsed.¹⁰ These attitudes were reflected in our study.

The survey did indicate that if non-users were recommended probiotics by their GP, the majority (80%) would consider taking them. A study undertaken by McConnon et al¹¹ in Leeds, UK showed that people feel that GPs and health professionals are the most trustworthy sources of health information.

We found extensive availability and advertising of probiotic products in Dunedin, and individuals were most strongly influenced by advertising (media), but more strongly influenced by doctors than pharmacists and health shops. Mostly unspecific claims were made on the packaging but we found 29 specific claims in related brochures, pamphlets and web pages.

It seems evident that health professionals should be more aware of the benefits and potential risks of these products, however this information should be evidence-based and research into the area needs to be ongoing. Particular areas that seem to be lacking in the current literature are direct comparisons of efficacy between different probiotic formulations, and the long-term benefits and risks of probiotic use.

Until this evidence becomes available, apart for information on the packaging, consumers should be urged to adopt a healthy scepticism regarding the efficacy of probiotics.

Competing interests: None.

Author information: Michael Schultz, Senior Lecturer and Consultant Gastroenterologist, Department of Medical and Surgical Sciences, Medicine Section, University of Otago, Dunedin; Achmed Baranchi, Medical Student, University of Otago, Dunedin; Lynda Thurston, Yu Ching Yu, Lily Wang, Jonathan Chen, Mark Sapsford, Joseph Chung, Maysa Binsadiq, Lauren Craig, and Ben Wilkins, Trainee Interns, Department of Preventive and Social Medicine, University of Otago, Dunedin; David McBride, Senior Lecturer in Occupational Health, Department of Preventive and Social Medicine, University of Otago, Dunedin; Peter Herbison, Professor of Biostatistics, Department of Preventive and Social Medicine, University of Otago, Dunedin

Correspondence: Dr Michael Schultz, University of Otago, Department of Medical and Surgical Sciences, Medicine Section, PO Box 913, Dunedin, New Zealand.
Fax: +64 (0)3 4747724; email: michael.schultz@stonebow.otago.ac.nz

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