Just because you can…does not mean you should: an examination of efficacy and potential harms from non-prescribed supplements taken by members of the Christchurch Health and Development Study at age 40

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The development and sale of non-prescribed dietary supplements is a growing industry. According to Euromonitor (2020)[1] the value of global retail sales of non-prescribed supplements increased by 105% between 2007 and 2021. New Zealand's market grew by 72% during the same period from NZ$194.8 million to NZ$335.5 million. Global demand for supplements such as vitamins C and D, minerals and herbal supplements increased as the COVID-19 pandemic has worsened despite, in most cases, no scientific evidence that their consumption can directly combat SARS CoV-2.[2]

While multivitamin supplementation is useful for pregnant people, vegans, older people, post-bariatric surgery[3,4] or during extremely stressful circumstances,[5] meeting nutrient intakes through diet rather than supplementation is preferable.[6] Non-clinical populations derive little benefit from using supplements and in extreme cases there is potential for interactions between products, toxicity due to chronic high dosages or financial hardship due cost.[7,8] Further, there is no specific legislation governing natural health products in New Zealand.[9] In this study, we examine self-reported use of non-prescribed supplements among birth cohort of individuals at age 40.

Methods

Participants

Participants were members of the Christchurch Health and Development Study (CHDS). The CHDS is a study of 1,265 children (630 females) born in Christchurch in 1977. This cohort has been studied regularly from birth to age 40 using a combination of interviews with parents and participants, standardised testing, teacher report and official record data.[10] The age 40 assessment of n=904 participants (472 female) represented 74.1% of the surviving cohort. All phases of the study were subject to ethical approval by the Regional Health and Disabilities Ethics Committee.

Measures

Biological sex

Biological sex of the participant was recorded at birth.

Non-prescribed medicines

At age 40, participants reported details of any non-prescribed medications or dietary supplements they were currently taking on a regular basis. Information gathered included the product name or type of product(s) and reason for use. Products were categorised according to Australian Food, Supplement and Nutrient Database (AUSNUT) 2011–2013.[11]

Prescribed medicines

At age 40, participants reported details of any prescribed medicines for physical or mental health problems used on a regular basis. Information gathered included the product name or type of product(s), reason for use, and dose of the product(s). This information was used to assess possible interactions between prescribed medicines and dietary supplements.

Analysis

Non-prescribed supplements were tabulated by sex of the participant. A Chi-squared test of independence and an independent samples t-test were used to assess if there were statistically significant differences between the proportion of males and females using supplements and the

number of supplements taken. Hand-searching of the New Zealand Formulary (NZF)[12] identified supplements that may cause interactions with prescribed medications. Efficacy and dose-checking used National Institutes of Health Dietary Supplement Fact Sheets.[3]

Results

At age 40, more than one third (36.4%; 329/904) of participants reported using a supplement. Nearly half (47.1%; 155/329) of them were also using prescription medication. More females took supplements than males (61.4%; (202/329) vs 38.6%; (130/329), χ^2 (1, N=904)=17.492, p<.01). The highest number of supplements taken was nine for females and seven for males. On average, females also took more supplements than males (female mean (SD) 1.04 (1.27); male mean (SD) 0.93 (1.14)); however, no statistically significant difference was found (t(590)=-1.12, p=0.26). Of the 626 products taken, the most commonly consumed were vitamins and minerals (60.7%; n=243); non-nutritive products (12.5%; n=78) (probiotics, coenzyme Q10, and bee products); oil supplements (9.6%; n=60); herbal botanical/homeopathic supplements (9.6%; n=60); nutritive products (fibre, protein, amino acids); (3.5%; n=22); remainder was unspecified.

Analysis showed 11.9% (39/329) of participants took products with insufficient evidence of therapeutic effects e.g., turmeric/curcumin for "IBS and joints"; evening primrose oil for "anti-inflammatory" reasons; spirulina for "gut health". In addition, 30.4% (100/329) of participants were taking supplements with no evidence of efficacy for the reason it was being consumed e.g., magnesium for "sleep"; fish oil for "allergies"; vitamin C for "immunity".

Ten of the 329 participants taking supplements were exposed to potential interactions. Six identified interactions were of moderate severity:[12] levothyroxine and magnesium (three participants); iron and zinc (two participants); levothyroxine and iron (one participant). In all cases, these combinations can cause reduced bioavailability of both products.[12] In addition potential interactions were identified for three participants: zopiclone and melatonin (risk of additive depressant effects on the central nervous system); warfarin and niacinamide (risk of increased prothrombin times) which have theoretical evidence of moderate severity); metformin and glucosamine (risk was increased blood glucose concentrations in patients with diabetes from case report with evidence of mild severity). Few participants reported the dosage of their non-prescribed products as collection of this information was not in the interview schedule. However, one participant reported taking 500mg of magnesium per day (tolerable upper level estimated is 350mg), while another participant was consuming 500mg vit C, above the Recommended Dietary Allowance (RDA) of 75mg.[3]

Discussion

In their analysis of trends in the vitamin and dietary supplements market, Pricewaterhouse-Coopers (PWC) predict that sales of supplements will continue to increase due to consumer awareness of purported benefits of nutraceutical products.[2] This study reports the supplementation practices of CHDS participants, showed that more than one third of participants took supplements. Participants potentially exposed themselves to interaction effects by combining prescribed and non-prescribed products; some were also taking excessive doses. Many of the non-prescribed products lacked efficacy for treating the stated health problem. The CHDS cohort was aged 40 years at the time of this study; as the population ages and it will be important to regularly reassess use of both prescribed and non-prescribed products as supplement use will likely increase.

Limitations include how reports may be subject to recall problems, or that participants may not report use of common products such as paracetamol because of how they interpreted the interview questions (e.g., "regular" use). It is also possible that products taken in non-oral forms may be under-reported. Multivitamins were unable to be assessed for efficacy or potential interactions as their specific formulations were not known. Finally, duration and dosage of supplementation was not assessed limiting assessment of harmful exposures. A strength of the study is that the participants have often been interviewed during adulthood, reporting on many sensitive and personal issues including medical conditions. Therefore, it is unlikely that reported prescribed and non-prescribed products will differ substantially from actual use.

In conclusion, clinicians should encourage patients to use diet to attain nutrition. Clinicians should also encourage information sharing of supplement consumption by their patients. A large proportion of patients used supplements and there is potential for interactions with prescription medication or for symptoms of excess consumption. Often, non-prescribed products are a waste of money offering no health benefit.

COMPETING INTERESTS
Nil.

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