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REFERENCES

Please visit:
<https://www.nhdmag.com/references.html>



100% FRUIT JUICE: JUST ANOTHER SUGARY DRINK?

Fruit juice (FJ) and fruit in general, have had a bit of a bad time recently. In some countries, health organisations have even gone so far as reframing the well-used phrase “fruit ‘n’ veg” to “veg ‘n’ fruit” in order to encourage consumption of vegetables over fruit.

In the UK, 100% FJ can count towards your five a day, but only at a maximum daily serving of 150ml. 100% FJ is also classified as a source of ‘free sugars’ of which we’re advised to limit to less than 5% of total daily energy. Countries such as France, the Netherlands and Belgium have recently excluded 100% FJ from their five-a-day recommendations, due to the natural sugar content.

Intakes of 100% FJ by adults and older children are falling, potentially due to the increased emphasis on reducing consumption of free sugars. But intakes of fruit and vegetables remain low, with only around 30% of adults achieving the five-a-day recommendation.¹ So, with all of this to consider, should we be advising the public to drink 100% FJ or not?

WHAT'S IN 100% FRUIT JUICE?

A recent survey by IPSOS (a global market research company), found that 31% of healthcare professionals weren't convinced that 100% FJ has nothing extra added to it.² Yet, a European directive strictly controls 100% FJ production, meaning that legally nothing can be added or removed, i.e. no added sugars, sweeteners, preservatives or colourings. This directive also ensures that the micronutrient, sugar and water content of 100% FJ closely resembles that of the intact fruit.

100% orange juice (OJ) contains enough potassium, vitamin C and folate to allow nutrition claims to be made on pack and in consumer communications (see highlighted rows in Table 1). Since

folate intake is falling in all age groups (and is essential for certain groups, i.e. women of child-bearing age), consumption of 100% OJ might help contribute to sufficient folate intake. The vitamin C content of 100% OJ also provides a convenient way to increase iron absorption when consumed alongside a meal that contains non-haem iron.

Table 1 also compares the nutrition composition of 100% OJ to that of the whole orange, illustrating the similarities between most nutrients, with an obvious exception being fibre. It's for this reason that some argue it's better to consume the whole fruit rather than the juice; but does drinking juice displace consumption of intact fruit? Looking at data from the National Diet and Nutrition Survey (NDNS), those consuming 100% FJ were actually more likely to achieve the five-a-day recommendation, due to greater intake of whole fruit and vegetables.³ This may be because drinks often aren't consumed in place of foods, so 100% FJ can be added to meals without displacing key components.

In addition, even though whole oranges contain more carotenoids and hesperidin (a polyphenol) than OJ, differences in bioavailability ensure that similar or greater amounts of these important plant bioactives are absorbed by the body following consumption of juice.^{4,5} This may be due to the slightly higher fibre content of whole oranges inhibiting absorption, or earlier saturation of gut receptors for the bioactive compounds.

Table 1: Nutrition composition of 100% orange juice vs the whole orange

Per 100g	100% OJ	Whole orange
Energy (kcal)	41	36
Total sugars (g)	9	8.2
Fibre (g)	0.5	1.2
Potassium (mg)	176	122
Vitamin C (mg)	45	52
Phosphorus (mg)	15.3	16
Calcium (mg)	11	24
Magnesium (mg)	9.5	8
Iron (mg)	0.2	0.1
Zinc (mg)	0.1	Tr
Thiamin (mg)	0.08	0.2
Riboflavin (mg)	0.02	0.03
Niacin (mg)	0.3	0.5
Vitamin B6 (mg)	0.07	0.05
Folate (µg)	21.5	33
Vitamin A (µg)	4.1	9
Vitamin E (µg)	0.8	0.4
Hesperidin (mg)	52	222-240
Total carotenoids (mg)	0.7	0.33

PACKAGED JUICE vs FRESH JUICE

Some claim that freshly squeezed FJ tastes better than packaged, but taste preferences aside, how do they stack up nutritionally? Packaged juice can either be squeezed and briefly pasteurised onsite before transportation (not from concentrate), or concentrated by water evaporation under vacuum and reconstituted elsewhere (concentrate). The amount of vitamin C and potassium is similar between juices made from concentrate and those not made from concentrate since manufacturers attempt to protect the vitamin C during production by limiting exposure to oxygen. In addition, packaged 100% FJ contains 3.6 times more flavonoids (hesperidin and narirutin) than freshly squeezed FJ. This is thought to be due to the mechanical action of commercial processing machinery, which can force more flavonoids (present in the pith of the fruit) into the juice.

In terms of bioavailability, one study found that a glass of packaged 100% OJ provided

2.8 times more hesperetin (a metabolite of hesperidin) than an identical glass of freshly squeezed 100% OJ.⁶ This could be important, as fruit bioactives such as flavonoids have been shown to support health and potentially reduce the risk of certain chronic diseases.⁷

Common processing methods used with 100% FJ, such as pasteurisation and refrigeration, have been shown to minimally reduce nutrient levels. Studies have shown that 100% OJ stored for 10 months at 4°C and for six months at ambient temperature contained 20mg/100ml vitamin C.^{8,9} This remains above the cut-off for 'source of' claims in European law.

Juice made from concentrate can also be beneficial, as it means large volumes of water don't have to be shipped in order for juices to be made available in areas that don't grow certain fruits. Juices from concentrate also don't require refrigeration, meaning they're often cheaper. This ensures 100% FJ remains an accessible drink choice for many income levels.

IS 100% FJ JUST ANOTHER SUGARY DRINK?

Comparing 100% FJ with sugar-sweetened beverages (SSBs), are there any differences in terms of metabolic response within the body? A recent randomised crossover study gave participants either a caffeine-free SSB or 100% OJ matched for total sugar content.¹⁰ Individual glucose patterns after meals were more erratic when consuming SSBs as opposed to OJ. This may be in part related to the lower glycaemic index (GI) of 100% OJ (GI=50) compared with that of SSBs (GI=63).¹¹ Indeed, OJ has a GI that is only slightly above whole oranges (GI=43). The hesperidin content of 100% OJ is one proposed reason for this, as hesperidin has been shown to slow down the absorption of natural sugars from the juice.¹² These results are further supported by meta-analyses of randomised controlled trials, which find an overall neutral impact of 100% FJ intake on glycaemic control and Type 2 diabetes risk, despite the free sugar content.^{13,14}

FJ has also been investigated for its effects on cardiovascular health. A 12-week randomised controlled trial (n=100) found reduced blood pressure and enhanced effects in the antioxidant defense system from daily consumption of 500ml OJ.¹⁵ Another study found that consuming 100% OJ alongside a high saturated fat meal attenuated the postprandial rise in IL-17 (a marker of

inflammation), compared with water.¹⁶ These beneficial effects are seen in prospective studies also; a recent trial with 34,000 adults found that drinking up to one glass per day of 100% FJ is significantly associated with a 12-17% reduced risk of cardiovascular disease and coronary heart disease and a 20-24% reduced risk of stroke.¹⁷

There is also emerging research from animal studies demonstrating the potential for hesperetin to modify the gut microbiota, resulting in increased short-chain fatty-acid production.¹⁸ However, it remains to be seen whether this translates into benefits for humans upon consumption of flavonoid-containing food and drink.

CONCLUSION

100% FJ certainly isn't just another sugary drink in terms of nutritional composition or its effects on our health and risk of disease. There seems to be no harm (and potential benefits to be gained) in recommending consumption of 150ml 100% FJ daily. Since low fruit intake is in the top three dietary factors responsible for half of all preventable deaths, according to the latest Global Burden of Disease report, encouraging consumption of 100% FJ may prove beneficial to public health by increasing total fruit consumption.¹⁹



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