Anecdote: bitter melons lower blood pressure, probably one reason being increased urine

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ABSTRACT. I ate 6 "bitter melons" (Momordica charantia) over a span of 6 days, and it lowered my blood pressure. I solicit data from "citizen scientists" on the internet who want to try the same experiment on themselves – if enough email me their data, then I will update the paper to incorporate it.

"Bitter" flavors are rare in western cuisine. Examples include: Grapefruit, coffee, cocoa (used in chocolate), hops (used in beer), quinine (used in tonic water), olives (when uncured), dandelion greens, escarole, citrus peel, and gentian (used in cocktail "bitters"). Several of those foods have medical effects. A famous ultra-bitter synthetic chemical is "denatonium benzoate," discovered in 1958 by MacFarlan Smith. This chemical is believed harmless, but even extremely dilute (parts per million) solutions of it have an unbearably nauseatingly bitter taste. For that reason it has found commercial uses in helping to render substances such as antifreeze undrinkable (saving people who might otherwise be poisoned) while causing only a negligible cost increase and efficacy decrease.

Although rarely eaten in Europe and the Americas, "**bitter melon**," Momordica charantia, is widely used in the cuisines of East & South Asia. It is grown in South Asia, Africa (where it originated), and the Caribbean. The fruits are comparable in shape and size to a cucumber (smaller than large cucumbers, but larger than the small kinds normally used for pickles) and have a thick, green, bumpy, wrinkled rind. In contrast to most Western kinds of "melons" (Cucumis melo) where you eat the sweet interior flesh raw and discard the rind, with bitter melon it is the opposite! You discard the interior flesh and seeds (white and/or red), and the only part you eat is the outer rind (green), and that normally only after cooking. For this reason it is common to stuff them with, e.g, pork.

Bitter melon has a bitter taste; how bitter depends upon the breed and preparation method. Most people do not like it. But after repeatedly eating it anyway, they adapt and dislike it less, or even grow to like it. In traditional Chinese medicine, bitter melon has long been claimed to have numerous beneficial health effects – which I'd always figured were probably mostly bullshit.

Here I report what happened to me when I ate six bitter melons over a span of six days, eating 2,1,1,0,1,1 on the successive days. I'm male, height 5 foot 9 inches (176 cm), and my weight at this time was 167 lb (76 kg), although during the prior 10 years had varied between about 153 and 170 lb (69-77 kg). I believe my "optimum" weight would be 154 lb (70 kg), but unfortunately usually am above that. During all those years my diet has been substantially more vegetarian than the usual USA diet, but not 100%. My resting pulse is normally between 58 and 64 beats per minute. During the bitter melon week (January 2023) I was age 58.

In retrospect it appears I gained approximately 0.7 grams per day (0.26 kg/year) on average over my adult lifetime, which is a difficult trend to perceive as it is happening because my weight varies more than 1 kg over a single day. It would have been very difficult to eat, say, exactly 2 fewer

grams of food per day.

I noticed more than (I estimate a factor 1.5, and during the first two bitter melon days more like 2 times) my usual output of urine; and it appeared more watery and less yellow than usual. This was only a subjective assessment; I did not measure my urine. But it was surprising enough to inspire me to perform this study.

Using automated upper-arm cuff machines, I took my blood pressure several times, the first after 2 melons, the second after 4, and the third after the full 6 melons, finding 106/63, 107/67 and 104/70. These readings were for me low. Previous readings I had recorded from 2016 to 2021 were (in chronological order; I'll regard these as equispaced in time, even though that is not exactly true) 102/72, 113/71, 110/60, 120/70, and 120/70. Finally, 3, 5, and 7 days after the bitter week ended, I took my blood pressure again, finding 123/83, 127/85, and 121/83. (All these readings Systolic/Diastolic in mmHg using my left arm. For me there is little or no systematic difference for my right arm versus my left, although some people do have a systematic difference.)

Confidence calculation I. If we compress the two (systolic S and diastolic D) numbers down to a single number X=(2S+3D)/5, then we find for the five 2016-2021 blood pressure readings 84.0, 87.8, 80.0, 90.0, 90.0; for the 3 readings during bitter melon week 80.2, 83.0, 83.6; and for the three afterwards 99.0, 101.8, and 98.2. In all this is 11 numbers X; and the three during bitter melon week all were among the 4 lowest. The chance that, by luck, among 11 random numbers, the 3 "bitter" numbers all would happen to be within the 4 lowest, is 4!8!/11!=4/165≈2.44%.

Alternative confidence calculation II. If we instead let X=S, i.e. ignore diastolic entirely, the bitter week X were 106, 107 and 104; the prior X were 102, 113, 110, 120, and 120; and the later X were 123, 127, and 121. (If we ignore the bitter melon week, there is a disturbing trend here of about 2.88mmHg gain per year during 2016-2023.) Again the three bitter X are among the 4 lowest, and the same 97.6% confidence happens as in the X=(2S+3D)/5 calculation.

Alternative confidence calculation III. If we instead define X=D+S, then the five 2016-2021 blood pressure readings become 174, 184, 170, 190, 190; the 3 readings during bitter melon week 169, 174, 174; and the two afterwards 206, 212, and 204. Again this is 11 numbers X; and the three during bitter melon week all were among the 5 lowest. The chance that, by pure luck, among 11 random numbers, the 3 "bitter" numbers all would happen to be within the 5 lowest, is 5!8!/(2·11!)=2/33≈9.667%.

Alternative confidence calculation IV. If we instead let X=D, i.e. ignore systolic entirely, the bitter week X were 63, 67 and 70; the prior X were 72, 71, 60, 70, and 70; and the later X were 83, 85, and 83. The chance that, by luck, among 11 random numbers, the 3 "bitter" numbers all would happen to be within the 6 lowest, is 6!8!/(6·11!)=4/33≈12.12%.

All of the above confidence calculations I-IV employed "nonparametric statistics," i.e. only examined the *ordering* of the X's, ignoring their magnitudes aside from that. But one also do "parametric" confidence calculations. The latter tend to be more powerful, but the price paid for that power is: you need to assume more about your data; and your assumptions might be wrong.

Confidence V. To illustrate that idea using systolic pressures only, the non-bitter systolic dataset {102, 113, 110, 120, 120; 123, 127, 121} has mean=117 and sample standard devation σ=8.106.

Meanwhile the mean of the three bitter-week measurements {106, 107, 104} was 105.667, i.e. 11.333, i.e. 1.398σ, below the non-bitter mean. The chance, if you sample three times from a normal density with mean μ and variance σ^2 (normality *assumed*), that the mean of your three samples will be ≤μ-1.398σ, equals erfc(1.398[3/2]$^{1/2}$)/2≈0.0077.

Confidence VI. Finally as our most sophisticated model, *assume* my systolic BP is a normal whose mean *increases* 2.88mmHg per year. In that case my *time-adjusted* systolic non-bitter numbers are {122, 129, 122, 132, 124; 123, 127, 121} with mean=125 and σ=3.928. The bitter mean 105.667 is 20.333 below 125, that is 5.177σ below. The chance, if you sample three times from a normal density with mean μ and variance σ^2 that the mean of your three samples will be ≤μ-5.177σ, equals erfc(5.177[3/2]$^{1/2}$)/2≈1.5×10^{-19}, for 99.99999999999999985% confidence.

All those calculations assumed statistical *independence* of all BP measurements (which I'd tried to assure by spacing all measurements at least 2 days apart), which is the topmost flaw (if any), e.g. perhaps there was some mysterious other reason my BP dropped (or rose the next week) that actually had nothing to do with bitter melons. Although I doubt that, it seems perhaps 10^{-4} likely – anyhow certainly more likely than 10^{-19}. If so, all confidences must be capped at 99.99%.

Conclusion. This all causes me to suspect that bitter melons stimulate your kidneys to produce more urine and for that and/or some other reason lower blood pressure (apparently by between 5-25 mmHg for a 1 melon/day dose; and due to active substances apparently having a pharmacological "half-life" within your body of between 0.5 and 3 days); and hence might be useful as therapy for high blood (especially systolic) pressure. The confidence of this ranges from 83% to 99.99999999999999985% depending on what single-number measure "X" of blood pressure we are considering, and whether we use a nonparametric or normal- or moving-mean-normal assumption-based confidence calculation.

Of course I am only one person, so this unfortunately cannot be claimed to be a usefully-large "scientific study." It is merely an "anecdote." But searching the literature on "pubmed" found two bitter melon studies on rats (Clouatre et al 2011, Zeng et al 2022). Both indicated bitter melon, or rather extracts of it, reduced BP in rats, especially systolic. In net I find this fairly impressive, and it is enough to convince me that a larger human study might be worthwhile.

Specifically, if 3-20 other people who each have recorded a goodly number of prior blood pressure readings were to do the same experiment I did, then that likely would either (a) boost all confidences above 99.9% or (b) refute my finding, showing bitter melon really has little or no effect.

I hereby solicit data from all "citizen scientists" interested in doing that as a community science project. Email me (`warren.wds@gmail.com`) info saying your age, gender, weight, height, typical resting pulse rate, and any medical conditions you have that sound relevant; and then a dated list of your blood pressure measurements before, during, and after eating about 1 bitter melon per day for about 1 week (record how many). In my part of the USA many supermarkets and drugstores offer automated blood pressure & pulse rate machines for free public use. You also can buy such machines to use at home, such as the Yewell YE680B, which as of January 2023 was high-rated on the internet, works on either arm, both speaks and writes, and was available from Amazon at a

cost of about $35.

Send me your data regardless of whether you feel it led in your case to a positive or negative finding. If and when enough people send me said data, I will update this paper. Also state whether or not you would like your name publicly listed (if "yes" I will add you as a coauthor or co-participant or whatever; otherwise I will just list you as "anonymous"). If you are really gung ho you also could measure your urine volume each day.

References

Dallas L. Clouatre et al: Bitter melon extracts in diabetic and normal rats favorably influence blood glucose and blood pressure regulation, J. Med. Food 14,12 (Dec 2011) 1496-1504. Pubmed 21861717. "In experiment II, all test groups had lowered systolic, but not diastolic, blood pressure."

L.Zeng, M.Chen, et al: Momordica charantia Extract Confers Protection Against Hypertension in Dahl Salt-Sensitive Rats, Plant Foods Human Nutrit. 77,3 (Sep. 2022) 373-382. Pubmed 35705768. "Thus, the present study indicated that feeding Momordica charantia could avoid high-salt-induced hypertension in DSS rats."