

## Supplementary Online Content

Yokoyama Y, Nishimura K, Barnard ND, et al. Vegetarian diets and blood pressure: a meta-analysis. *JAMA Intern Med*. Published online February 24, 2014.  
doi:10.1001/jamainternmed.2013.14547.

**eTable 1.** Electronic database search strategy

**eTable 2.** Designs and characteristics of populations of studies of vegetarian diets and blood pressure

**eTable 3.** Blood pressure responses of subgroups to vegetarian diets (clinical trials)

**eTable 4.** Blood pressure responses of subgroups to vegetarian diets (observational studies)

**eReferences.**

This supplementary material has been provided by the authors to give readers additional information about their work.

**eTable 1. Electronic database search strategy**

Search	Query	Items found
#30	Search #28 AND #29	222
#29	Search <b>english</b> [Language]	18841491
#28	Search #26 AND #27	242
#27	Search #7 OR #8 OR #9 OR #10 OR #11 OR #12 OR #13 OR #14 OR #15 OR #16 OR #17 OR #18 OR #19 OR #20 OR #21 OR #22 OR #23 OR #24 OR #25	3019
#26	Search #1 OR #2 OR #3 OR #4 OR #5 OR #6	600247
#25	Search <b>Vegan Diet</b> [Title/Abstract]	180
#24	Search <b>Vegan Diet</b> [Text Word]	180
#23	Search " <b>Vegan Diets</b> "[Title/Abstract]	79
#22	Search " <b>Vegan Diets</b> "[Text Word]	79
#21	Search " <b>Diets, Vegan</b> "[Title/Abstract]	0
#20	Search " <b>Diets, Vegan</b> "[Text Word]	0
#19	Search " <b>Diet, Vegan</b> "[Title/Abstract]	0
#18	Search " <b>Diet, Vegan</b> "[Text Word]	0
#17	Search <b>Vegetarianism</b> [Title/Abstract]	282
#16	Search <b>Vegetarianism</b> [Text Word]	310
#15	Search " <b>Vegetarian diet</b> "[Title/Abstract]	725
#14	Search " <b>Vegetarian diet</b> "[Text Word]	2686
#13	Search " <b>Vegetarian diets</b> "[Title/Abstract]	335
#12	Search " <b>Vegetarian diets</b> "[Text Word]	336
#11	Search " <b>Diet, Vegetarian</b> "[Title/Abstract]	0
#10	Search " <b>Diet, Vegetarian</b> "[Text Word]	1
#9	Search " <b>Diet, Vegetarian</b> "[Mesh]	2471
#8	Search " <b>plant based diet</b> "[Title/Abstract]	141
#7	Search " <b>plant based diet</b> "[Text Word]	141
#6	Search <b>hypertension</b> [Title/Abstract]	269552
#5	Search " <b>blood pressure</b> "[Title/Abstract]	214819
#4	Search <b>hypertension</b> [Text Word]	357879
#3	Search " <b>blood pressure</b> "[Text Word]	354076
#2	Search <b>hypertension</b> [Mesh]	203732
#1	Search " <b>blood pressure</b> "[Mesh]	241060

**eTable 2. Designs and characteristics of populations of studies of vegetarian diets and blood pressure**

**Clinical Trials**

Study, year (Reference NO)	Country	Study design Duration	N†	Mean age, year†	Male (%)†	Mean SBP (mmHg) †	Mean DBP (mmHg) †	Antihypertensive Medication (%)†	Mean BMI (kg/m <sup>2</sup> )†	Alcohol intake†	Intervention‡ Food preparation	Adjusted factors	Blood pressure measurements
Ferdowsian et al., 2010 (1)	US	P-O 22 w	113 (68/45)	44.4 (46.0/42.0)	17.7 (26.5/4.4)	117.8 (118.8/116.4)	79.7 (80.5/78.4)	Some	NR	history of unresolved alcohol were excluded	Vegan Yes (2/day)		multiple measurements
Nicholson et al., 1999 (2)	US	P-O* 12 w	11 (7/4)	54.3 (51.0/60.0)	54.5 (57.1/50.0)	141.3 (136.6/149.5)	84.7 (84.0/86.0)	81.8 (71.4/100)	NR	regular drinking excluded	Vegan Yes		multiple measurements
Sciarrone et al., 1993 (3)	Australia	P-O* 6 w	20 (10/10)	41.0 (41.1/40.8)	100	134.2 (132.4/136.0)	77.2 (76.8/77.5)	None	25.3 (25.5/25.0)	more than 20g ethanol a day excluded	Lacto-ovo Yes	age, sex, BMI, protein, Na	dairy continuous measurements
Hakala et al., 1989 (4)	Finland	P-O* 52 w	73 (31/42)	38.0 (NR)	24.7 (25.8/23.8)	129.9 (127.0/132.0)	85.0 (82.1/87.1)	None	34.4 (34.4/34.4)	(9.7 / 4.8 % energy)	Lacto No	age, sex, overweight	multiple measurements
Kestin et al., 1989 (5)	Australia	C-O* 6 w	17	44.0	100	128.0	79.0	None	25.5	(4.2 / 4.8 % energy)	Lacto-ovo Yes (major sources of protein and fat)	sex, energy, protein, fat, carbohydrate, cholesterol, Na, K, Ca, Mg	multiple measurements
Margetts et al., 1986 (6)	Australia	C-O* 6 w	39	49.9	71.8	155.4	99.9	None	27.6	All subjects were told not to alter alcohol consumption	Lacto-ovo Yes (meat substitutes)	vitamin C	multiple measurements

---

Rouse et al., 1983a (7)	Australia	C-O* 6 w	38	40.1	50.0	127.7	76.4	None	23.7	All subjects were told not to alter alcohol consumption	Lacto-ovo Yes (2/day)	sex	multiple measurements
----------------------------	-----------	-------------	----	------	------	-------	------	------	------	--	--------------------------	-----	--------------------------

---

BMI, body mass index; C, cross over; DBP, diastolic blood pressure; NR, not reported; O, Open label; P, parallel; SBP, systolic blood pressure

\* randomized controlled trials

† (vegetarian diet group / control diet group)

‡ *vegan* diets, defined as omitting all animal products, or vegetarian diets that include some animal products as indicated by the terms “lacto” (dairy products), “ovo” (eggs)

## Observational Studies

Study, year (Reference NO)	Country	Study design	N*	Mean age, year*	Male (%)*	SBP (mmHg) *	DBP (mmHg) *	Antihypertensive Medication (%)*	Mean BMI (kg/m <sup>2</sup> )*	Alcohol intake*	Exposure† Duration of exposure	Adjusted factors	BP/ Dietary measurement
Kim et al., 2012 (8)	South Korea	Cross Sectional	107 (59/48)	62.6 (63.0/62.1)	0	141.4 (132.8/151.9)	85.3 (81.1/90.4)	NR	23.8 (22.7/25.2)	Mild alcohol drinker 9.4% (0/20.8 %)	Lacto-ovo >20 y	age, sex	multiple measurements 24DR
Pettersen et al., 2012 (9)	US, Canada	Cross Sectional (Adventist Health Study2)	431 (233/198)	62.8 (64.4/61.0)	36.7 (35.2/38.4)	125.1 (123.3/127.9)	74.8 (72.6/78.1)	24.8 (21.5/29)	26.7 (24.9/29.5)	minimal or absent in both groups 6.75%	Mixed (vegan, lacto-ovo) >1 y		multiple measurements FFQ
Yang et al., 2012 (10)	China	Cross Sectional	295 (169/126)	33.3 (32.6/34.2)	100	120.5 (116.6/125.8)	74.7 (71.3/79.2)	None	24.0 (23.6/24.4)	regular drinking excluded	Lacto >5 y	sex	multiple measurements interview or questionnaire
Chen et al., 2011 (11)	Taiwan	Cross Sectional	363 (173/190)	51.9 (54.0/49.9)	0	121.4 (122.3/120.6)	71.6 (72.0/71.3)	None	23.1 (22.9/23.3)	NR	Lacto-ovo >1 y	sex	NR interview or questionnaire
Fernandes Dourado et al., 2011 (12)	Brazil	Cross Sectional	87 (29/58)	40.0 (NR)	58.6 (NR)	120.8 (114.9/123.8)	75.9 (73.2/77.2)	NR	24.3 (24.0/24.4)	Alcohol consumption (0/12.1 %)	Lacto-ovo >1 y (mean 16 y)	age, sex	NR 24 DR

Rodenas et al., 2011 (13)	Spain	Cross Sectional	26 (14/12)	68.4 (65.8/71.4)	0	135.4 (126.4/145.8)	73.4 (67.1/80.8)	None	24.2 (23.2/25.3)	NR	Mixed (meatless) current	sex	NR weighing method
Yang et al., 2011 (14)	China	Cross Sectional	300 (171/129)	33.3 (32.6/34.2)	100	120.3 (116.0/126.0)	74.4 (71.0/79.0)	None	23.9 (23.6/24.4)	excluded	Lacto-ovo >1 y (mean 10.4y)	age, sex, BMI, smoking, alcohol intake, diabetes, hypertension, hyperlipemia	NR 24 DR
Lin et al., 2010 (15)	Taiwan	Cross Sectional	204 (102/102)	46.1 (46.6/45.5)	0	117.3 (114.8/119.7)	75.2 (77.0/73.3)	NR	23.4 (23.4/23.3)	NR	Vegan mean 17.8 y	age, sex, BMI, education	NR NR
Pitla et al., 2009 (16)	India	Cross	29 male (14/15)	46.2 (50.5/49.1)	100	125.0 (123.9/126.0)	81.7 (79.0/84.1)	NR	24.8 (25.0/24.6)	17 %	Lacto lifetime	sex	multiple measurements interview or questionnaire
		Sectional	23 female (12/11)	45.4 (45.5/44.0)	0	117.8 (117.6/118.0)	76.1 (77.4/73.6)		24.9 (25.3/23.9)	None			
Nakamoto et al., 2008 (17)	Japan	Cross	49 male (20/29)	44.1 (45.2/43.4)	100	124.9 (118.3/129.4)	78.6 (71.7/83.3)	NR	22.5 (21.4/23.2)	NR	Mixed (lacto-ovo, semi) current	age, sex	NR 24 DR
		Sectional	73 female (55/18)	45.4 (45.9/43.8)	0	113.4 (111.7/118.4)	68.4 (67.0/72.8)		21.4 (21.3/21.9)				
Slavicek et al., 2008 (18)	Czech	Cross Sectional	396 (195/201)	47.4 (47.7/47.2)	34.1 (33.3/34.8)	125.5 (118.1/132.6)	75.8 (70.8/80.7)	NR	23.6 (22.1/25.1)	NR	Lacto-ovo >5 y		NR NR
Fontana et al., 2007	US	Cross Sectional	42 (21/21)	53.1 (53.1/53.1)	61.9 (61.9/61.9)	118.0 (104.0/132.0)	70.5 (62.0/79.0)	None	23.9 (21.3/26.5)	NR	Vegan >2y	age, sex, height	multiple measurements

(19)											(mean 4.4 y)	24 DR	
Teixeira et al., 2007 (20)	Brazil	Cross Sectional (MONICA OMS Project)	201 (67/134)	47.0 (NR)	47.8 (47.8/47.8)	122.0 (108.0/129.0)	81.0 (71.0/86.0)	11.4 (1.5/16.4)	25.3 (22.6/26.7)	vegetarian < control	Mixed (vegan, lacto, lacto-ovo, pesco) >5y (mean 19 y)	age, sex, socioeconomic class, race	multiple measurements interview or questionnaire
Sebekova et al., 2006 (21)	Slovakia	Cross Sectional	136 (90/46)	37.5 (37.7/37.1)	36 (33.3/41.3)	112.3 (110.9/115.0)	70.9 (70.4/71.9)	None	23.1 (22.7/23.8)	NR	Lacto-ovo >2y (mean 10.3 y)		NR FFQ

Su et al., 2006 (22)	Taiwan	Cross Sectional	118 (57/61)	58.4 (59.2/57.7)	0	127.2 (127.8/126.7)	72.0 (71.1/73.0)	None	23.3 (23.0/23.5)	regular drinking excluded	Mixed (vegan, lacto) >5 y (mean 10.4 y)	age, sex	NR NR
Goff et al., 2005 (23)	UK	Cross Sectional	46 (21/25)	35.5 (35.0/36.0)	46.7 (50.0/44.0)	118.7 (112.7/123.7)	68.6 (66.9/70.1)	NR	23.1 (22.7/23.4)	NR	Vegan >3 y	age, sex, BMI, ethnicity	multiple measurements 24 DR
Appleby et al., 2002 (24)	UK	Cross Sectional (EPIC- Oxford)	1557male (858/699)	48.7 (43.7/54.0)	100	125.5 (125.9/125.0)	77.2 (77.4/77.0)	46.3 (41.2/56.5) Includes nutritional supplements	23.9 (23.2/24.6)	<1g ethanol/d (23.0/11.2 %)	Mixed (vegan, lacto-ovo) current	age, sex, BMI, alcohol intake, protein, carbohydrate, total fat, saturated fat, polyunsaturated fat, energy, P/S ratio, Na, K, Ca and Mg (plus male: vigorous exercise, female: hormone exposure)	single measument FFQ and questionnaire
Lu et al., 2000 (25)	Taiwan	Cross Sectional	53 male (26/27)	38.0 (37.7/38.3)	100	106.1 (102.0/110.0)	70.0 (69.0/71.0)	None	21.9 (20.8/22.9)	more than 10g/d were excluded	Mixed (vegan, lacto) >2 y	age, sex	NR 24 DR
Famodu et al., 1998 (26)	Nigeria	Cross Sectional (Ilsan Cohort)	76 (36/40)	48.6 (48.6/48.7)	NR	110.1 (111.0/109.2)	76.1 (78.3/74.1)	NR	28.8 (28.5/29.1)	Veg follow abstinence from alcohol	Mixed (vegan, lacto-ovo, semi)		multiple measurements FFQ



												current	
Harman et al., 1998 (27)	New Zealand	Cross	23 male (12/11)	44.7 (49.0/40.0)	100	123.5 (119.4/128.0)	77.4 (73.7/81.5)		25.2 (24.1/26.4)		Mixed (vegan, lacto)	age, sex	multiple measurements
		Sectional	24 female (12/12)	41.0 (43.0/39.0)	0	115.0 (117.2/112.7)	72.9 (71.0/74.8)	NR	24.7 (23.6/25.8)	excluded	current		FFQ
Williams, 1997 (28)	US	Cross	7253 male (199/7054)	45.9 (45.2/45.9)	100	121.7 (122.1/121.7)	77.1 (76.6/77.1)		23.8 (22.9/23.8)	39.1/85.6 ml	Mixed (vegan, lacto)	Sex	NR
		Sectional	1989 female (152/1837)	40.3 (38.8/40.4)	0	112.9 (111.9/113.0)	71.7 (72.6/71.6)	NR	21.2 (20.8/21.3)	26.3/52.8 ml	current		interview or questionnaire
Wyatt et al., 1995 (29)	Mexico	Cross	72 (36/36)	39.0 (NR)	NR	115.0 (110.5/119.5)	78.5 (74.9/82.0)	None	24.4 (23.4/25.3)	(1/89 %)	Lacto-ovo >1 y (mean 5.1 y)	age, sex	NR 24 DR
Melby et al., 1994 (30)	US	Cross	167 (122/45)	47.5 (47.6/47.4)	26.3 (27/24.4)	119.2 (118.7/120.4)	77.7 (77.4/78.5)	26.7 (25.1/31.1)	28.1 (27.9/28.6)	(n=0/n=2)	Mixed (vegetarian, semi) current	age, sex	multiple measurements FFQ
Orlov et al., 1994 (31)	Finland	Cross	20 (9/11)	49.2 (47.0/51.0)	NR	131.3 (121.0/139.8)	78.9 (70.5/85.7)	NR	21.4 (19.5/22.9)	NR	Vegan >1 y		NR 24 DR
Melby et al., 1989 (32)	US	Cross	114 black (55/59)	55.4 (54.7/56.1)	21.9 (NR)	126.4 (122.8/129.7)	74.5 (74.2/74.8)	31.5 (18/44)	28.9 (26.3/31.4)	None	Mixed (meatless) 20.6 y	age, sex, BMI, waist/hip ratio	multiple measurements
		Sectional	264 white (164/100)	52.5 (52.4/52.6)	15.9 (NR)	114.8 (114.7/115.0)	66.9 (66.7/67.2)	12.7 (7/22)	25.7 (24.6/27.4)	(n=1/n=2)	Mixed (meatless)		FFQ

												27.2 y		
Sanders et al., 1987 (33)	UK	Cross Sectional	22 male	31.5	100	115.0	70.5	None	21.5	(6/21 g/d)	Vegan >1 y	age, sex, height, weight, physical activity and smoking habits	NR 24 DR	
			(11/11)	(32.0/31.0)		(116.0/114.0)	(75.0/66.0)		(21.1/21.8)					
			22 female	26.0	0	111.0	68.5		20.6	(0/1 g/d)				
			(11/11)	(28.0/24.0)		(115.0/107.0)	(70.0/67.0)		(20.6/20.6)					
Wiseman et al., 1987 (34)	UK	Cross Sectional	52	34.4	48.1	113.5	73.1	None	NR	NR	Mixed (vegan, lacto)	Age	NR 24 DR	
			(34/18)	(34.4/34.5)	(32.4/77.8)	(112.8/115.0)	(70.0/79.0)				>3 y (mean 13.4 y)			
Ophir et al., 1983 (35)	Israel	Cross Sectional	196	60.9	51.0	136.4	82.3	NR	NR	vegetarian group follow abstinence from alcohol	Lacto-ovo >3 y (mean 19 y)	NR Interview or questionnaire		
Rouse et al., 1983b (36)	Australia	Cross Sectional	80 male	32.8	100	117.9	69.9	None	23.6	BP was not related to past use of alcohol	Lacto-ovo current	age, sex, BMI	multiple measurements 24 DR	
			(47/33)	(33.2/32.2)		(115.6/121.1)	(68.7/71.7)		(22.9/24.7)					
			100 female	33.7	0	109.5	67.0		23.8					
			(51/49)	(33.9/33.4)		(109.1/109.9)	(66.7/67.4)		(23.3/24.4)					
Burr et al., 1981 (37)	UK	Cross Sectional	111 male	56.0	100	137.5	84.6	NR	24.0	Weekly drinkers (31/50 %)	Mixed (meat and fish less than once a month or not at all)	sex, age (<60, +60)	NR 24 DR	
			(29/82)	(61.3/54.1)		(140.4/136.5)	(86.1/84.1)		(22.1/24.7)					
			189 female	53.6	0	140.4	84.2		23.3	Weekly drinkers (23.2/39.1 %)	>5 y			
			(56/133)	(55.2/52.9)		(143.5/139.1)	(85.6/83.6)		(22.3/23.7)					

Haines et al., 1980 (38)	UK	Cross	236 male	48.7	100	137.8	87.1	NR	NR	NR	Mixed (vegan, lacto-ovo) current	age, sex, skinfold thickness	NR
		Sectional (Northwick Park Heart Study)	(25/211)	(40.3/49.7)		(128.0/139.0)	(79.0/88.0)						
Armstrong et al., 1979 (39)	Australia	Cross	204	50.6	33.2	145.0	89.9	NR	23.5	NR (partly adjusted)	Lacto-ovo current	age, sex	single
		Sectional	(102/102)	(51.2/50.1)	(Sex match)	(141.9/148.0)	(88.9/90.9)						measument interview or questionnaire

BMI, body mass index; DBP, diastolic blood pressure; DR, diet record; FFQ, food frequency questionnaire; NR, not reported; SBP, systolic blood pressure  
 \* (vegetarian diet group / control diet group)

† *semi-vegetarian* diets, defined as rarely including meat, *vegan* diets, defined as omitting all animal products, or vegetarian diets that include some animal products as indicated by the terms “lacto” (dairy products), “ovo” (eggs), or “pesco” (fish)

**eTable 3. Blood pressure responses of subgroups to vegetarian diets (Clinical Trials)**

Group	SBP								DBP							
	N	Net change	95% CI		<i>p</i> -value	between group <i>p</i> -value	<i>p</i> for heterogeneity	<i>I</i> <sup>2</sup> (%)	N	Net Change	95% CI		<i>p</i> -value	between group <i>p</i> -value	<i>p</i> for heterogeneity	<i>I</i> <sup>2</sup> (%)
			Lower	Upper							Lower	Upper				
<b>Age</b>																
<45	5	-5.5	-7.6	-3.4	<0.001		0.574	0	5	-3.0	-4.6	-1.4	<0.001		0.600	0
≥45	2	-3.1	-6.5	0.3	0.073	0.244	0.217	34.5	2	-1.1	-3.0	0.8	0.274	0.121	0.375	0
<b>Sex</b>																
100% male	2	-2.4	-8.5	3.7	0.441		0.621	0	2	-0.8	-5.7	4.0	0.740		0.979	0
50-99% male	3	-5.1	-7.8	-2.3	<0.001		0.120	52.8	3	-1.9	-3.2	-0.5	0.009		0.348	5.2
50-99% female	2	-4.4	-8.5	-0.3	0.034	0.740	0.516	0	2	-4.8	-8.0	-1.7	0.003	0.200	0.436	0
<b>BMI</b>																
<25	1	-6.8	-9.6	-4.0	<i>p</i> <0.001		1.000	0	1	-2.7	-4.7	-0.7	0.008		1.000	0
≥25	4	-3.2	-5.8	-0.7	0.013	0.182	0.954	0	4	-1.2	-3.0	0.5	0.162	0.168	0.983	0
<b>Diet type*</b>																
Vegan	2	-4.3	-10.2	1.5	0.147		0.153	51.0	2	-4.8	-8.2	-1.3	0.007		0.138	54.6
Lacto	1	-3.3	-9.1	2.6	0.280		1.000	0	1	-2.5	-9.2	4.2	0.462		1.000	0
Lacto-ovo	4	-4.8	-7.5	-2.0	0.001	0.899	0.349	8.9	4	-1.8	-3.2	-0.5	0.007	0.295	0.731	0
<b>Sample size</b>																
<100	6	-4.5	-6.6	-2.4	<0.001		0.339	11.9	6	-1.8	-3.1	-0.5	0.007		0.804	0
≥100	1	-5.7	-11.4	0.0	0.050	0.700	1.000	0	1	-5.5	-9.1	-1.9	0.003	0.057	1.000	0

Duration of vegetarian diet																
<12 weeks	4	-5.0	-7.3	-2.7	<0.001		0.349	8.9	4	-1.8	-3.2	-0.5	0.007		0.731	0
≥12 weeks	3	-3.9	-7.7	-0.1	0.044	0.626	0.337	8.1	3	-4.3	-7.4	-1.2	0.006	0.149	0.278	21.9
Antihypertension Medication†																
Some	2	-4.5	-10.0	1.0	0.109		0.153	51.0	2	-4.8	-8.2	-1.3	0.007		0.138	54.6
None	5	-4.7	-6.8	-2.5	p<0.001	0.957	0.442	0	5	-1.9	-3.2	-0.6	0.005	0.121	0.856	0
Baseline blood pressure																
Normal	1	-5.7	-11.4	0.0	0.051		1.000	0	1	-5.5	-9.1	-1.9	0.003		1.000	0
Pre-hypertension	4	-5.2	-7.8	-2.5	<0.001		0.408	0	4	-2.4	-4.2	-0.6	0.008		0.921	0
Hypertension, stage 1	2	-3.0	-6.9	0.9	0.132	0.614	0.217	34.5	2	-1.1	-3.0	0.8	0.274	0.097	0.375	0
Region/Country																
Europe	1	-3.3	-9.1	2.6	0.280		1.000	0	1	-2.5	-9.2	4.2	0.462		1.000	0
North America	2	-4.3	-10.2	1.5	0.147		0.153	51.0	2	-4.8	-8.2	-1.3	0.007		0.138	54.6
Oceania	4	-4.8	-7.5	-2.0	0.001	0.899	0.349	8.9	4	-1.8	-3.2	-0.5	0.007	0.295	0.731	0

BMI; body mass index, CI; confidence interval, DBP; diastolic blood pressure, NR; not reported, SBP; systolic blood pressure

\* *vegan* diets, defined as omitting all animal products, or vegetarian diets that include some animal products as indicated by the terms “lacto” (dairy products) or “ovo” (eggs)

† Some; some participants use antihypertension medication

**eTable 4. Blood pressure responses of subgroups to vegetarian diets (Observational Studies)**

Group	SBP							DBP								
	N ‡	Net change	95% CI		<i>p</i> -value	between n group <i>p</i> -value	<i>P</i> (%)	N ‡	Net Change	95% CI		<i>p</i> -value	between n group <i>p</i> -value	<i>P</i> (%)		
			Lower	Upper						Lower	Upper					
<b>Age</b>																
<45	11	-5.9	-10.0	-1.7	0.005		<0.001	71.9	11	-4.4	-7.5	-1.3	0.005	<0.001	81.5	
≥45	19	-7.7	-10.8	-4.5	<0.001	0.789	<0.001	93.1	19	-4.8	-7.1	-2.5	<0.001	0.939	<0.001	94.2
<b>Sex</b>																
100% male	2	-9.6	-16.0	-3.2	0.003		0.734	0	2	-8.0	-13.2	-2.7	0.003	0.986	0	
50-99% male	3	-18.5	-24.7	-12.4	<0.001		0.001	86.1	3	-10.1	-14.9	-5.3	<0.001	0.001	85.3	
50-99% female	9	-7.5	-10.9	-4.2	<0.001		<0.001	84.3	9	-5.4	-8.0	-2.8	<0.001	<0.001	90.1	
100% female	5	-5.3	-10.1	-0.5	0.030		<0.001	85.9	5	-3.0	-6.6	0.6	0.104	<0.001	89.7	
NR	3	-5.0	-11.3	1.2	0.115	0.001	0.004	81.8	3	-4.3	-9.4	0.8	0.100	0.057	<0.001	93.6
<b>BMI</b>																
<25	23	-6.7	-9.3	-4.2	<0.001		<0.001	90.8	23	-4.3	-6.2	-2.4	<0.001	<0.001	91.6	
≥25	5	-5.7	-10.8	-0.6	0.029	0.511	<0.001	91.1	5	-3.7	-7.5	0.1	0.059	0.310	<0.001	95.3
<b>Diet type*</b>																
Vegan	5	-9.5	-15.5	-3.6	0.002		<0.001	90.0	5	-3.7	-8.1	0.7	0.101	<0.001	93.2	
Lacto	2	-5.6	-13.6	2.3	0.163		0.020	81.5	2	-5.0	-11.3	1.3	0.119	0.011	84.5	
Lacto-ovo	10	-8.7	-12.3	-5.1	<0.001		<0.001	89.1	10	-5.4	-8.2	-2.6	<0.001	<0.001	89.2	
Mixed	15	-5.0	-8.0	-2.0	0.001	0.342	<0.001	89.6	15	-4.5	-6.7	-2.2	<0.001	0.918	<0.001	92.9

Sample size																
<100	13	-7.7	-11.5	-4.0	<0.001		<0.001	81.9	13	-5.8	-8.6	-3.1	<0.001		<0.001	89.1
≥100	17	-6.6	-9.5	-3.7	<0.001	0.795	<0.001	93.8	17	-4.0	-6.2	-1.8	<0.001	0.594	<0.001	94.4
Duration of vegetarian diet																
>1 year	22	-8.1	-10.4	-5.7	<0.001		<0.001	88.1	22	-5.3	-7.1	-3.4	<0.001		<0.001	90.7
current	10	-3.9	-7.3	-0.4	0.027	0.051	<0.001	82.8	10	-3.4	-6.0	-0.7	0.013	0.252	<0.001	89.1
Antihypertension Medication†																
Some	5	-5.7	-11.3	-0.1	0.046		<0.001	94.9	5	-4.4	-8.7	-0.1	0.045		<0.001	96.3
None	12	-6.3	-10.2	-2.5	0.001		<0.001	86.6	12	-5.2	-8.2	-2.3	<0.001		<0.001	89.3
NR	15	-7.9	-11.4	-4.4	<0.001	0.745	<0.001	87.0	15	-4.5	-7.1	-1.9	0.001	0.913	<0.001	91.6
Baseline blood pressure																
Normal	11	-5.3	-8.6	-2.1	0.001		<0.001	82.6	11	-2.4	-4.8	-0.1	0.044		<0.001	89.2
Pre-hypertension	12	-9.9	-13.1	-6.8	<0.001		<0.001	89.2	12	-7.7	-9.9	-5.5	<0.001		<0.001	89.1
Hypertension, stage 1	2	-11.7	-19.8	-3.6	0.005	0.016	0.011	84.6	2	-5.4	-11.2	0.4	0.067	0.005	0.023	80.6
Region/Country																
Africa	1	1.5	-10.6	13.7	0.807		1.000	0	1	4.1	-5.4	13.5	0.397		1.000	0
Asia	10	-8.3	-12.2	-4.5	<0.001		<0.001	88.9	10	-4.9	-8.0	-1.9	0.001		<0.001	91.7
Europe	10	-5.6	-9.8	-1.4	0.008		<0.001	87.4	10	-4.8	-7.9	-1.6	0.003		<0.001	93.5
North America	5	-6.6	-12.0	-1.3	0.016		<0.001	88.1	5	-4.6	-8.9	-0.4	0.033		<0.001	91.7
Oceania	3	-3.4	-10.6	3.8	0.360		0.462	0	3	-2.8	-8.6	2.9	0.337		0.467	0
South America	3	-12.3	-19.4	-5.2	0.001	0.323	<0.001	88.7	3	-9.4	-15.2	-3.6	0.001	0.276	<0.001	87.3

BMI; body mass index, CI; confidence interval, DBP; diastolic blood pressure, NR; not reported, SBP; systolic blood pressure

\* *semi-vegetarian* diets, defined as rarely including meat, *vegan* diets, defined as omitting all animal products, or vegetarian diets that include some animal products as

indicated by the terms “lacto” (dairy products), “ovo” (eggs), or “pesco” (fish)

† Some; some participants use antihypertension medication

‡ Studies couldn't be included if there were inconsistency within each study's subgroups (ie. male and female subgroups or racial subgroups)



## eReferences

1. Ferdowsian HR, Barnard ND, Hoover VJ, et al. A multicomponent intervention reduces body weight and cardiovascular risk at a GEICO corporate site. *Am J Health Promot.* 2010;24(6):384-387.
2. Nicholson AS, Sklar M, Barnard ND, Gore S, Sullivan R, Browning S. Toward improved management of NIDDM: a randomized, controlled, pilot intervention using a lowfat, vegetarian diet. *Prev Med.* 1999;29(2):87-91.
3. Sciarrone SE, Strahan MT, Beilin LJ, Burke V, Rogers P, Rouse IL. Biochemical and neurohormonal responses to the introduction of a lacto-ovovegetarian diet. *J Hypertens.* 1993;11(8):849-860.
4. Hakala P, Karvetti RL. Weight reduction on lactovegetarian and mixed diets: changes in weight, nutrient intake, skinfold thicknesses and blood pressure. *Eur J Clin Nutr.* 1989;43(6):421-430.
5. Kestin M, Rouse IL, Correll RA, Nestel PJ. Cardiovascular disease risk factors in free-living men: comparison of two prudent diets, one based on lactoovovegetarianism and the other allowing lean meat. *Am J Clin Nutr.* 1989;50(2):280-287.
6. Margetts BM, Beilin LJ, Vandongen R, Armstrong BK. Vegetarian diet in mild hypertension: a randomised controlled trial. *Br Med J (Clin Res Ed).* 1986;293(6560):1468-1471.
7. Rouse IL, Beilin LJ, Armstrong BK, Vandongen R. Blood-pressure-lowering effect of a vegetarian diet: controlled trial in normotensive subjects. *Lancet.* 1983;321(8314-8315):5-10.
8. Kim MH, Bae YJ. Postmenopausal vegetarians' low serum ferritin level may reduce the risk for metabolic syndrome. *Biol Trace Elem Res.* 2012;149(1):34-41.
9. Pettersen BJ, Anousheh R, Fan J, Jaceldo-Siegl K, Fraser GE. Vegetarian diets and blood pressure among white subjects: results from the Adventist Health Study-2 (AHS-2). *Public Health Nutr.* 2012;15(10):1909-1916.
10. Yang SY, Li XJ, Zhang W, et al. Chinese lacto-vegetarian diet exerts favorable effects on metabolic parameters, intima-media thickness, and cardiovascular risks in healthy men. *Nutr Clin Pract.* 2012;27(3):392-398.
11. Chen CW, Lin CT, Lin YL, Lin TK, Lin CL. Taiwanese female vegetarians have lower lipoprotein-associated phospholipase A2 compared with omnivores. *Yonsei Med J.* 2011;52(1):13-19.
12. Fernandes Dourado K, de Arruda Cámara E Siqueira Campos F, Sakugava Shinohara NK. Relation between dietary and circulating lipids in lacto-ovo vegetarians. *Nutr Hosp.* 2011;26(5):959-964.
13. Rodenas S, Sánchez-Muniz FJ, Bastida S, Sevillano MI, Larrea Marín T, González-Muñoz MJ. Blood pressure of omnivorous and semi-vegetarian postmenopausal women and their relationship with dietary and hair concentrations of essential and toxic metals. *Nutr Hosp.* 2011;26(4):874-883.
14. Yang SY, Zhang HJ, Sun SY, et al. Relationship of carotid intima-media thickness and duration of vegetarian diet in Chinese male vegetarians. *Nutr Metab (Lond).* 2011;8(1):63. doi:10.1186/1743-7075-8-63.
15. Lin CK, Lin DJ, Yen CH, et al. Comparison of renal function and other health outcomes in vegetarians versus omnivores in Taiwan. *J Health Popul Nutr.* 2010;28(5):470-475.
16. Pitla S, Nagalla B. Gender-related differences in the relationship between plasma homocysteine, anthropometric and conventional biochemical coronary heart disease risk factors in middle-aged

- Indians. *Ann Nutr Metab.* 2009;54(1):1-6.
17. Nakamoto K, Watanabe S, Kudo H, Tanaka A. Nutritional characteristics of middle-aged Japanese vegetarians. *J Atheroscler Thromb.* 2008;15(3):122-129.
  18. Slavíček J, Kittnar O, Fraser GE, et al. Lifestyle decreases risk factors for cardiovascular diseases. *Cent Eur J Public Health.* 2008;16(4):161-164.
  19. Fontana L, Meyer TE, Klein S, Holloszy JO. Long-term low-calorie low-protein vegan diet and endurance exercise are associated with low cardiometabolic risk. *Rejuvenation Res.* 2007;10(2):225-234.
  20. Teixeira RdeC, Molina MdelC, Zandonade E, Mill JG. Cardiovascular risk in vegetarians and omnivores: a comparative study. *Arq Bras Cardiol.* 2007;89(4):237-244.
  21. Sebeková K, Boor P, Valachovicová M, et al. Association of metabolic syndrome risk factors with selected markers of oxidative status and microinflammation in healthy omnivores and vegetarians. *Mol Nutr Food Res.* 2006;50(9):858-868.
  22. Su TC, Jeng JS, Wang JD, et al. Homocysteine, circulating vascular cell adhesion molecule and carotid atherosclerosis in postmenopausal vegetarian women and omnivores. *Atherosclerosis.* 2006;184(2):356-362.
  23. Goff LM, Bell JD, So PW, Dornhorst A, Frost GS. Veganism and its relationship with insulin resistance and intramyocellular lipid. *Eur J Clin Nutr.* 2005;59(2):291-298.
  24. Appleby PN, Davey GK, Key TJ. Hypertension and blood pressure among meat eaters, fish eaters, vegetarians and vegans in EPIC-Oxford. *Public Health Nutr.* 2002;5(5):645-654.
  25. Lu SC, Wu WH, Lee CA, Chou HF, Lee HR, Huang PC. LDL of Taiwanese vegetarians are less oxidizable than those of omnivores. *J Nutr.* 2000;130(6):1591-1596.
  26. Famodu AA, Osilesi O, Makinde YO, Osonuga OA. Blood pressure and blood lipid levels among vegetarian, semi-vegetarian, and non-vegetarian native Africans. *Clin Biochem.* 1998;31(7):545-549.
  27. Harman SK, Parnell WR. The nutritional health of New Zealand vegetarian and non-vegetarian Seventh-day Adventists: selected vitamin, mineral and lipid levels. *N Z Med J.* 1998;111(1062):91-94.
  28. Williams PT. Interactive effects of exercise, alcohol, and vegetarian diet on coronary artery disease risk factors in 9242 runners: the National Runners' Health Study. *Am J Clin Nutr.* 1997;66(5):1197-1206.
  29. Wyatt CJ, Velazquez C, Grijalva I, Valencia ME. Dietary-intake of sodium, potassium and blood-pressure in lacto-ovo-vegetarians. *Nutr Res.* 1995;15(6):819-830. doi:10.1016/0271-5317(95)00048-N.
  30. Melby CL, Toohey ML, Cebrick J. Blood pressure and blood lipids among vegetarian, semivegetarian, and nonvegetarian African Americans. *Am J Clin Nutr.* 1994;59(1):103-109.
  31. Orlov SN, Agren JJ, Hänninen OO, et al. Univalent cation fluxes in human erythrocytes from individuals with low or normal sodium intake. *J Cardiovasc Risk.* 1994;1(3):249-254.
  32. Melby CL, Goldflies DG, Hyner GC, Lyle RM. Relation between vegetarian/nonvegetarian diets and blood pressure in black and white adults. *Am J Public Health.* 1989;79(9):1283-1288.
  33. Sanders TA, Key TJ. Blood pressure, plasma renin activity and aldosterone concentrations in vegans

- and omnivore controls. *Hum Nutr Appl Nutr.* 1987;41(3):204-211.
34. Wiseman MJ, Hunt R, Goodwin A, Gross JL, Keen H, Viberti GC. Dietary composition and renal function in healthy subjects. *Nephron.* 1987;46(1):37-42.
  35. Ophir O, Peer G, Gilad J, Blum M, Aviram A. Low blood pressure in vegetarians: the possible role of potassium. *Am J Clin Nutr.* 1983;37(5):755-762.
  36. Rouse IL, Armstrong BK, Beilin LJ. The relationship of blood pressure to diet and lifestyle in two religious populations. *J Hypertens.* 1983;1(1):65-71.
  37. Burr ML, Bates CJ, Fehily AM, St Leger AS. Plasma cholesterol and blood pressure in vegetarians. *J Hum Nutr.* 1981;35(6):437-441
  38. Haines AP, Chakrabarti R, Fisher D, Meade TW, North WR, Stirling Y. Haemostatic variables in vegetarians and non-vegetarians. *Thromb Res.* 1980;19(1-2):139-148.
  39. Armstrong B, Clarke H, Martin C, Ward W, Norman N, Masarei J. Urinary sodium and blood pressure in vegetarians. *Am J Clin Nutr.* 1979;32(12):2472-2476.