Research and Best Practice

Japanese dietary habits: Results from a questionnaire survey on 305 health check-up participants

Toh Yoon Ezekiel Wong, Hirohiko Murata

Abstract

Introduction The Japanese diet has been associated with a healthier lifestyle and lower obesity rates. However, dietary habits may also be important. To investigate the dietary habits of Japanese people, we conducted a survey at the health check-up center of Hiroshima Kyoritsu Hospital.

Methods 305 Japanese adults who received health check-ups and participated in the questionnaire survey (conducted from January to February 2015) were enrolled. Basic information such as age, gender, body mass index (BMI) and mean arterial pressure (MAP) were recorded along with answers and analysed.

Results Participant's age ranged from 22 to 77 years old, BMI ranged from 15.4 to 35.0 kg/m^2 and the average MAP was 90.7 ± 14.3 mmHg. 58% of the respondents started their meals with a vegetable dish. 74% of the participants ate between 10 to 29 minutes on average. Those who skipped breakfast (19%) had significantly higher BMI than those who ate breakfast. Those who stopped eating at 80% satiety had lower BMI as well as MAP levels compared to those who ate until 100% satiety.

Conclusions The survey showed that simple practices like starting meals with vegetables, eating regular breakfast and stopping at 80% satiety were all part of the Japanese dietary habit. These dietary habits are relatively easy to follow and may contribute to a healthier lifestyle.

doi.org/10.29102/clinhp.17003

About the AUTHORS

Department of Internal Medicine, Hiroshima Kyoritsu Hospital. Hiroshima City, Japan

Contact:
Toh Yoon Ezekiel Wong
easybs@hotmail.com

Introduction

According to the World Report on Ageing and Health 2015, Japanese people have the highest life expectancy at birth (1). Two key behaviours that may influence healthy ageing are physical activity and nutrition. The Japanese diet (Washoku) is not only considered healthy but is also recognized as a cultural treasure by UNESCO since 2013. Short-term intake of Japanese diet have been shown to prevent and improve metabolic syndrome (2). Closer adherence to Japanese dietary guidelines was also found to be associated with a lower risk of total mortality in Japanese adults (3). Although the Japanese diet has been associated with a healthier lifestyle and lower obesity rates, each country differs in their access to various food sources and therefore not everyone can benefit by simply reproducing such a diet over the long term.

Dietary habits may also contribute to a healthier lifestyle and the emulation of these habits may be a more practical approach in the search for a health promoting lifestyle. To investigate the dietary habits of healthy Japanese people, we conducted a questionnaire survey at the health check-up center of Hiroshima Kyoritsu Hospital and report the results in this article.

Methods

305 Japanese adults who received health check-ups at the health check-up center of Hiroshima Kyoritsu Hospital and who were willing to participate in the questionnaire survey were enrolled in this study. The health check-up center is located at the hospital's outpatient floor and is open to those who wish to undergo screening for various underlying conditions. The survey was conducted during a two week period from January to February 2015. Those who were not willing to participate in the survey during the given period and those who did not complete the questionnaire forms were

Editorial Office, WHO-CC • Clinical Health Promotion Centre • Health Science, Lund University, Sweden

Research and Best Practice

excluded from the analysis. A questionnaire regarding eating habits and dietary patterns (listed in Table 2) was included along with a routine questionnaire that our health check-ups recipients are usually required to answer. In total, 10 questions with multiple choices were asked. Demographic data and basic information such as age, gender, body mass index (BMI) and mean arterial pressure (MAP) were also recorded along with the answers and these were analyzed for the study (cross-sectional). MAP was estimated with the measured systolic (SP) and diastolic (DP) pressures using the equation MAP = [SP + (2×DP)] / 3 with the measurements taken during normal resting heart rates.

Continuous variables are expressed as mean (standard deviation, with or without range). Categorical (qualitative) variables are expressed as numbers (percentage). Comparisons for continuous variables were made using the Student t-test for normal data and the Mann-Whitney U test for non-parametric data. Statistical significance was defined as $p < 0.05$ and analysis was performed using XLSTAT2014 for Windows (Addinsoft Ltd., Paris, France). This study protocol was reviewed and approved by the ethics review committee of Hiroshima Kyoritsu Hospital.

Table 1 Characteristics of survey participants (n=305)

Age, years, mean (SD, range)	51.1 (10.7, 22 - 77)
Gender (male/female)	105/200
BMI, kg/m^2, mean (SD, range)	22.7 (3.6, 15.4 - 35.0)
MAP, mmHg, mean (SD, range)	90.7 (14.3, 56.7 - 139.0)

SD: Standard deviation; BMI: Body mass index; MAP: Mean arterial pressure.

Results

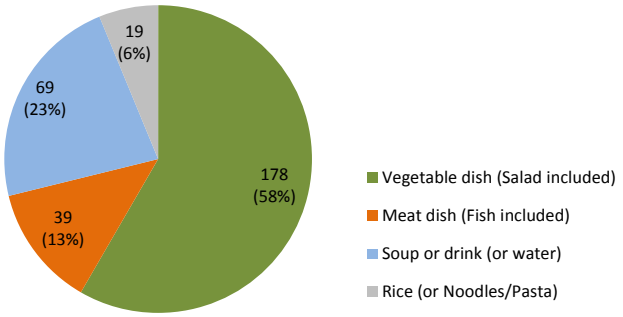
The basic characteristics of participants in the survey are summarized in Table 1. Participant's age ranged from 22 to 77 years old, the average being 51.1 ± 10.7 (SD) years old. 105 men and 200 women participated in the survey. BMI of participants ranged from 15.4 to 35.0 kg/m^2 (mean 22.7 ± 3.6 kg/m^2) and the mean MAP was 90.7 ± 14.3 mmHg. Questions (along with participant's answers) regarding eating habits and dietary pattern are summarized in Table 2. 58% started their meals with a vegetable or salad dish and 23% started their meals with liquid (soup or drink). 13% of respondents started their meals with the meat or fish dish and only 6% started with rice or noodles (Figure 1).

Table 2 Results from a questionnaire survey on 305 health check-up participants

Questions and answers	n	(%)
Question 1: Which food item do you start with at meals?		
• Vegetable dish (Salad included)	178	(58)
• Meat dish (Fish included)	39	(13)
• Soup or drink (or Water)	69	(23)
• Rice (or Noodles/Pasta)	19	(6)
Question 2: How long does each meal last on average?		
• Less than 10 minutes	21	(7)
• 10 to 29 minutes	227	(74)
• 30 to 59 minutes	51	(17)
• 60 minutes or more	6	(2)
Question 3: How many times do you chew before swallowing?		
• Less than 10 times	92	(30)
• 10 to 19 times	178	(58)
• 20 to 29 times	31	(10)
• 30 times or more	4	(1)
Question 4: How often do you skip breakfast?		
• 3 times or more per week	57	(19)
• Less than 3 times per week	248	(81)
Question 5: When do you have the last meal of the day?		
• Less than 2 hours before sleeping	85	(28)
• More than 2 hours before sleeping	220	(72)
Question 6: When do you stop eating?		
• Stop at 80% satiety (80% full)	157	(51)
• Stop at 100% satiety (Until I am full)	148	(49)
Question 7: What will you choose when you want to drink something other than water?		
• Green tea	113	(37)
• Coffee (without sugar)	77	(25)
• Black tea (or other kinds of tea)	61	(20)
• Coffee (with sugar)	20	(7)
• Juice (or Non-carbonated drinks)	18	(6)
• Carbonated drinks (Zero-calorie drinks included)	15	(5)
Question 8: What do you use to sweeten your drink or food?		
• Sugar	232	(76)
• Other sweeteners	73	(24)
Question 9: How often do you snack after dinner?		
• 3 times or more per week	66	(22)
• Less than 3 times per week	239	(78)
Question 10: Do you want to lose weight?		
• Yes	204	(67)
• Not really	101	(33)

Research and Best Practice

Figure 1 Food item that survey participants start with at meals



For 74% of participants, an average meal lasts between 10 to 29 minutes (Question 2). 17% reported their average meal lasting between 30 to 59 minutes. 58% of those surveyed chewed their food 10 to 19 times before swallowing (Question 3) while 30% chewed less than 10 times before swallowing. Only 19% of survey participants skipped breakfast more than 3 times a week (Question 4) and only 28% had their last meal of the day less than 2 hours before going to bed (Question 5). 51% of respondents stopped eating when they were 80% full while the remaining 49% reported eating until they had reached 100% satiety (Question 6).

Regarding the choice of drink, 37% of respondents chose green tea, 25% chose coffee without sugar and 20% chose black tea (or other kinds of tea). Juice and carbonated drinks were low on their list (Question 7). Only 24% of those surveyed used non-sugar or non-caloric sweeteners as an alternative (Question 8). Snacking after dinner 3 times or more per week was reported in only 22% of respondents (Question 9). As for whether the participants wanted to lose weight (Question 10), 204 (67%) replied "Yes" while the remaining 101 (33%) replied "Not really".

Table 3 shows the differences in BMI between answer groups for Questions 4, 5, 6, 8, 9 and 10. Those who skipped breakfast, those who had their last meal of the day less than 2 hours before going to bed and those who ate until they reach 100% satiety had significantly higher BMI levels than those who did not. Table 4 summarizes the differences in MAP between answer groups for the same questions (Questions 4, 5, 6, 8, 9 and 10). Quite similarly, those who had their last meal of the day less than two hours before going to bed and those who ate until they reached 100% satiety had significantly higher MAP levels than participants who did not.

Table 3 Differences in BMI between answer groups for Questions 4, 5, 6, 8, 9 and 10

Questions & Answers	BMI (kg/m²)	P-value†
Question 4: How often do you skip breakfast?		
• 3 times or more per week	23.5 (3.4)	**0.030**
• Less than 3 times per week	22.5 (3.7)	
Question 5: When do you have the last meal of the day?		
• Less than 2 hours before sleeping	23.5 (3.8)	**0.006**
• More than 2 hours before sleeping	22.4 (3.5)	
Question 6: When do you stop eating?		
• Stop at 80% satiety (80% full)	22.2 (3.5)	**0.010**
• Stop at 100% satiety (Until I am full)	23.2 (3.8)	
Question 8: What do you use to sweeten your drink or food?		
• Sugar	22.7 (3.6)	0.805
• Other sweeteners	22.8 (3.8)	
Question 9: How often do you snack after dinner?		
• 3 times or more per week	23.3 (3.9)	0.228
• Less than 3 times per week	22.5 (3.5)	
Question 10: Do you want to lose weight?		
• Yes	24.1 (3.2)	**< 0.0001**
• Not really	19.9 (2.8)	

Values expressed as mean (SD). BMI: Body mass index. †: Mann-Whitney U test for the differences between BMI of answer groups.

Table 4 Differences in MAP between answer groups for Questions 4, 5, 6, 8, 9 and 10

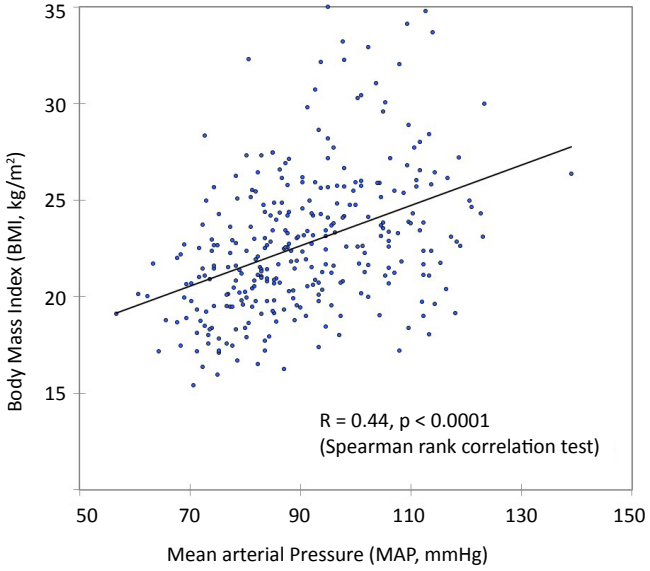
Questions & Answers	MAP (mmHg)	P-value†
Question 4: How often do you skip breakfast?		
• 3 times or more per week	92.1 (13.7)	0.471
• Less than 3 times per week	90.4 (14.4)	
Question 5: When do you have the last meal of the day?		
• Less than 2 hours before sleeping	93.3 (13.6)	**0.036**
• More than 2 hours before sleeping	89.7 (14.4)	
Question 6: When do you stop eating?		
• Stop at 80% satiety (80% full)	89.3 (14.3)	**0.049**
• Stop at 100% satiety (Until I am full)	92.3 (14.0)	
Question 8: What do you use to sweeten your drink or food?		
• Sugar	90.0 (14.2)	0.117
• Other sweeteners	92.8 (14.3)	
Question 9: How often do you snack after dinner?		
• 3 times or more per week	90.6 (14.6)	0.871
• Less than 3 times per week	90.7 (14.2)	
Question 10: Do you want to lose weight?		
• Yes	92.2 (13.9)	**0.011**
• Not really	87.8 (14.7)	

Values expressed as mean (SD). MAP: Mean arterial pressure. †: Mann-Whitney U test for the differences between MAP of answer groups.

Research and Best Practice

As for Question 10, respondents who wanted to lose weight had significantly higher BMI as well as MAP levels compared to those who did not really want to lose weight. BMI and MAP of survey participants were found to be significantly correlated (Figure 2).

Figure 2 The correlation between body mass index (BMI) and mean arterial pressure (MAP) of participants in the survey



Discussion

Some studies have demonstrated a positive effect of the Japanese diet on obesity, metabolic syndrome and mortality (2-4). However, few studies have investigated the dietary habits of Japanese adults and its relation to health (5). Although the Japanese Ministry of Health Labour and Welfare provide standardize questionnaires to health check-up centers that covers some behavioural aspects including eating habits such as breakfast skipping and eating out (6), the self-developed questionnaire used in this study is unique and comprises questions that are not commonly asked or explored.

One interesting finding was that the majority of those surveyed started their meals with either vegetables or liquid (Figure 1 and Table 1). This finding is interesting because it demonstrated that although rice and noodles may be the staple food in the region, most Japanese adults preload their stomach with liquid or fibre-rich vegetables first. Eating vegetables first have been shown to be simple and effective when it comes to improving glycaemic parameters in diabetic Japanese patients (7). The timing of salad consumption seem to affect energy intake during meals by increasing satiety while reducing the energy density of each meal, as shown in previous studies (8). Likewise, consuming liquid food (soup) has also been shown to enhance satiety and reduce energy intake (9). This way of starting a meal is very practical and may be emulated in almost every country, regardless of the differences in access to food sources.

Eating at a fast rate has also been demonstrated to increase the risk of Type 2 Diabetes mellitus and obesity (10;11). This survey showed that only 7% of the participants finished their meals within 10 minutes while the majority (74%) of meals were finished between 10 to 29 minutes. 17% reported taking 30 to 59 minutes to finish an average meal. Along with slower eating rates, increase in mastication and chewing are also shown to have a protective effect towards obesity and the risk for diabetes (12;13). The results of this survey showed that almost 60% of respondents chewed at least 10 to 19 times before swallowing. Eating speed and chewing rate are both modifiable eating habits that can also be applied with relative ease no matter your setting.

Although the causative effect is still controversial, skipping breakfast has long been associated with increase in obesity levels (14;15). Incidentally, in agreement with these earlier studies, the BMI of those who skipped breakfast in this survey were significantly higher compared to those who did not. Just like skipping breakfast, late meals or snacking is also associated with obesity and metabolic syndrome (16-18). In this study, participants who had late meals (less than two hours before going to bed) also had significantly higher BMI and MAP when compared to those who did not (Question 5). However, there were no differences in BMI or MAP levels between respondents who had a snack after dinner three times or more per week when compared to those who did not (Question 9).

There is a Japanese saying that when eating, eat only until you are 80% full (hara hachi bunme). In our survey, 51% of the respondents managed to practice this restraint during meals and their BMI as well as MAP levels were significantly lower compared to those who ate until 100% satiety. Discipline is required but these habits are also replicable to some extent.

When offered something to drink other than water, the most popular choice (37% of the respondents) in this survey was green tea. Drinking green tea is not only associated with lower obesity levels and cancer rates but has also been demonstrated in large studies to have a positive effect on overall mortality (19;20). Green tea may also protect against functional disability in the elderly (21). Coffee (25%) and black tea (20%) which were the second and third most popular choice re-

spectively, is also associated with lower risk of mortality, particularly mortality from cardiovascular disease (22;23). Although access to green tea may be difficult for some, coffee is a widely available commodity which can be taken with moderation on a regular basis. Regarding the use of artificial sweeteners, which is also an increasing trend in Japan, it remains unclear whether low-calorie sweeteners are beneficial for weight loss and if sugar alone is responsible for obesity or diabetes (24;25). The results of this survey showed that the majority of Japanese adults prefer sugar when they want to sweeten their food or drink. There were no differences in BMI or MAP for those who used sugar compared to those who used other sweeteners.

Recently, the issue of distorted body image and abnormal weight control among Japanese adults (particularly younger women) has been brought out in both media and literature (26). A question was added to check whether the survey participants had such issues (Question 10). Since those who wanted to lose weight had significantly higher BMI and MAP than those who did not, it may be safe to assume that body image distortion was not prominent among our respondents.

Although the survey gives new insight into Japanese dietary habits of healthy adults, there were notable limitations. Firstly, all participants were adults receiving health check-ups at our institution, either voluntary (presumably health conscious) or mandatory (due to employment regulation etc.). Therefore, the participants are not representative of the typical Japanese population. Secondly, the data collection did not include socio-economic factors like education and income. The statistical analysis in this study only involved simple comparison between groups and did not adjust for possible confounders. Future studies should aim to evaluate the association between socio-economic background and dietary habits.

Conclusions

The results of this survey showed that dietary habits themselves seem to be contributing to a healthy lifestyle. Simple practices like starting each meal with vegetables, eating slowly, chewing adequately, not skipping breakfast, not eating late at night (meals or snacks) and stopping at 80% satiety form part of the Japanese dietary habit. These dietary habits are relatively easy to follow and the results of this survey showed them to be associated with lower BMI and MAP levels. Focussing on such practical habits in addition to the diet itself may contribute to a healthier lifestyle, lower obesity rates and healthy aging.

Author Contributions

EWTY designed and performed the study, analyzed the data, and drafted the manuscript. HM overviewed the project/study. All authors read and approved the final manuscript.

Conflicts of Interest

None declared

References

(1) World Health Organisation. World Report on Ageing and Health. Luxembourg: WHO Library Cataloguing-in-Publication Data; 2015. Available from: http://who.int/ageing/events/world-report-2015-launch/en/
(2) Inoue H, Sasaki R, Aiso I, et al. Short-term intake of a Japanese-style healthy lunch menu contributes to prevention and/or improvement in metabolic syndrome among middle-aged men: a non-randomized controlled trial. Lipids Health Dis. 2014; 13: 57. Doi: 10.1186/1476-511X-13-57.
(3) Kurotani K, Akter S, Kashino I, et al. Quality of diet and mortality among Japanese men and women: Japan Public Health Center based prospective study. BMJ. 2016; 352:i1209. Doi: 10.1136/bmj.i1209.
(4) Arisawa K, Uemura H, Yamaguchi M, et al. Associations of dietary patterns with metabolic syndrome and insulin resistance: a cross-sectional study in a Japanese population. J Med Invest. 2014; 61:333-344.
(5) Mishra GD, Lee JS, Hayashi K, et al. How do health behaviours relate to dietary practice patterns among Japanese adults? Asia Pac J Clin Nutr. 2017; 26:351-357. Doi: 10.6133/apjcn.022016.01.
(6) Ministry of Health Labour and Welfare. Health Examination and Guidance Program for Japanese Adults. 2008 [cited 2014/12/22]; Available from: http://www.mhlw.go.jp/bunya/ shakaihosho/iryouseido01/info02a.html.
(7) Imai S, Matsuda M, Rhee O, et al. Effect of a Simple Meal Plan 'Eating Vegetable First Diet' on Glycemic Control for One Year in Japanese Patients with Type 2 Diabetes. . J Rehabilitation Health Science. 2009; 7: 27-31
(8) Rolls BJ, Roe LS, Meengs JS. Salad and satiety: energy density and portion size of a first-course salad affect energy intake at lunch. J Am Diet Assoc. 2004; 104:1570-1576.
(9) Flood JE, Rolls BJ. Soup preloads in a variety of forms reduce meal energy intake. Appetite. 2007; 49:626-634.
(10) Ohkuma T, Fujii H, Iwase M, et al. Impact of eating rate on obesity and cardiovascular risk factors according to glucose tolerance status: the Fukuoka Diabetes Registry and the Hisayama Study. Diabetologia. 2013; 56:70-77. Doi: 10.1007/s00125-012-2746-3.
(11) Sakurai M, Nakamura K, Miura K, et al. Self-reported speed of eating and 7-year risk of type 2 diabetes mellitus in middle-aged Japanese men. Metabolism. 2012; 61:1566-1571. Doi: 10.1016/j.metabol.2012.04.005.
(12) Yamazaki T, Yamori M, Asai K, et al. Mastication and risk for diabetes in a Japanese population: a cross-sectional study. PloS One. 2013; 8:e64113. Doi: 10.1371/journal.pone.0064113.
(13) Li J, Zhang N, Hu L, et al. Improvement in chewing activity reduces energy intake in one meal and modulates plasma gut hormone concentrations in obese and lean young Chinese men. Am J Clin Nutr. 2011; 94:709-716. Doi: 10.3945/ajcn.111.015164.
(14) Dhurandhar EJ. True, true, unrelated? A review of recent evidence for a causal influence of breakfast on obesity. Curr Opin Endocrinol Diabetes Obes. 2016; 23:384-388. Doi: 10.1097/MED.0000000000000281.
(15) Horikawa C, Kodama S, Yachi Y, et al. Skipping breakfast and prevalence of overweight and obesity in Asian and Pacific regions: a meta-analysis. Prev Med. 2011; 53:260-267. Doi: 10.1016/j.ypmed.2011.08.030.
(16) Gallant AR, Lundgren J, Drapeau V. The night-eating syndrome and obesity. Obes Rev. 2012; 13:528-536. Doi: 10.1111/j.1467-789X.2011.00975.x.
(17) Karatzi K, Moschonis G, Choupi E, et al. Late-night overeating is associated with smaller breakfast, breakfast skipping, and obesity in children: The Healthy Growth Study. Nutrition. 2017; 33:141-144. Doi: 10.1016/j.nut.2016.05.010.
(18) Kutsuma A, Nakajima K, Suwa K. Potential Association between Break-

fast Skipping and Concomitant Late-Night-Dinner Eating with Metabolic Syndrome and Proteinuria in the Japanese Population. Scientifica (Cairo). 2014; 2014:253581. Doi: 10.1155/2014/253581.
(19) Saito E, Inoue M, Sawada N, et al. Association of green tea consumption with mortality due to all causes and major causes of death in a Japanese population: the Japan Public Health Center-based Prospective Study (JPHC Study). Ann Epidemiol. 2015; 25:512-518.e3. doi: 10.1016/j.annepidem.2015.03.007.
(20) Liu J, Liu S, Zhou H, et al. Association of green tea consumption with mortality from all-cause, cardiovascular disease and cancer in a Chinese cohort of 165,000 adult men. Eur J Epidemiol. 2016; 31:853-865. Doi: 10.1007/s10654-016-0173-3.
(21) Tomata Y, Kakizaki M, Nakaya N, et al. Green tea consumption and the risk of incident functional disability in elderly Japanese: the Ohsaki Cohort 2006 Study. Am J Clin Nutr. 2012; 95:732-739. Doi: 10.3945/ajcn.111.023200.
(22) Je Y, Giovannucci E. Coffee consumption and total mortality: a meta-analysis of twenty prospective cohort studies. Br J Nutr. 2014; 111:1162-1173. Doi: 10.1017/S0007114513003814.
(23) Mineharu Y, Koizumi A, Wada Y, et al. Coffee, green tea, black tea and oolong tea consumption and risk of mortality from cardiovascular disease in Japanese men and women. J Epidemiol Community Health. 2011; 65:230-240. Doi: 10.1136/jech.2009.097311.
(24) Khan TA, Sievenpiper JL. Controversies about sugars: results from systematic reviews and meta-analyses on obesity, cardiometabolic disease and diabetes. Eur J Nutr. 2016; 55:25-43. Doi: 10.1007/s00394-016-1345-3.
(25) Miller PE, Perez V. Low-calorie sweeteners and body weight and composition: a meta-analysis of randomized controlled trials and prospective cohort studies. Am J Clin Nutr. 2014; 100:765-777. Doi: 10.3945/ajcn.113.082826.
(26) Shirasawa T, Ochiai H, Nanri H, et al. Association between distorted body image and changes in weight status among normal weight preadolescents in Japan: a population-based cohort study. Arch Public Health. 2016; 74:39. doi: 10.1186/s13690-016-0151-y.