

Research

*Corresponding author

Shaw Watanabe, MD, PhD

President

Life Science Promotion Association

25-3-1004, Daikyo-cho, Shinjuku-ku

Tokyo 160-0005, Japan

E-mail: watashaw@lifescience.or.jp

Volume 2 : Issue 3

Article Ref. #: 1000AFTNSOJ2136

Article History

Received: October 16th, 2016

Accepted: November 1st, 2016

Published: November 2nd, 2016

Citation

Utada I, Moriyama S, Hitomi S, et al. Wellness fasting for healthy longevity. *Adv Food Technol Nutr Sci Open J*. 2016; 2(3): 103-109. doi: [10.17140/AFTNSOJ-2-136](https://doi.org/10.17140/AFTNSOJ-2-136)

Copyright

©2016 Watanabe S. This is an open access article distributed under the Creative Commons Attribution 4.0 International License (CC BY 4.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Wellness Fasting for Healthy Longevity

Izumi Utada, BS¹; Satsuki Moriyama, BS¹; Satoko Hitomi, BS²; Hiroko Honda, BS¹; Reiko Takiguchi, BS¹; Tanji Hoshi, PhD³; Shaw Watanabe, MD, PhD^{3*}

¹AOB Keioh Group Corporatoin, Kobuchizawa, Yamanashi, Japan

²ARSOA HONSHA Corporation, Kobuchizawa, Yamanashi, Japan

³Life Science Promotion Association, Tokyo, Japan

ABSTRACT

Introduction: Increasing rates of obesity, diabetes and associated chronic diseases requires implementing a new method of integration for healthy longevity. We have elaborated to take the balance of food, physical activity and mind to achieve a healthy spiritual life by stimulating the self-healing capacity.

Objectives: All 161 registered participants to ARSOA Wellness Fasting from October, 2014 to December 2015 were analyzed.

Methods: About 20-25 participants each time stayed in a mountainous hotel, and received a combination of low-energy vegetarian diet (about 300 kcal intake by fermented vegetable juice per day), physical exercise (2-hour walking, slow training and stretch), meditation, and lectures about healthy life habits in the 4-day program. Facilities, such as foot spar, radon bath, and massage with/without oil were available in free time.

Results: Body weight decreased about 2 kg, and fat percent and muscle volume also decreased during 4 day fasting. Although headache, hungry, gastrointestinal (GI) tract distress, emesis, depressive and cold feeling occurred toward the 2nd day, these symptoms disappeared at the 4th day, and active and vivid feeling increased on the 4th day and after. Skin condition also became good by fasting. Symptoms, mood and body changes interacted and became better later.

Conclusion: Using this regimen, a new practical method of fasting for healthy longevity could be established.

KEYWORDS: Fasting; Wellness; Macrobiotics; Obesity; Fat percent; Symptoms; Health strategy.

ABBREVIATIONS: GI: Gastrointestinal; BMI: Body Mass Index; SEM: Structural Equation Modeling; WHO: World Health Organization.

INTRODUCTION

Diabetes mellitus, hypertension, and so on are linked to the obesity and metabolic syndrome. Existing guidelines, however, to help people achieve lifestyle change are difficult to practice.¹ Japanese life expectancy is 86 years for women and 81 years for men. Along with the extension of life span, discrepancy between lifespan and healthy life causes problem due to huge expansion of medical cost.² According to the Japanese government official, healthy life expectancy was 74.2 years for women, and 71.2 years for men, so it is nearly 12 years intervals for women and 10 years for men that needs any type of care to live.³ Here, healthy life is defined as not having activity limitation due to the health reason. Dietary control and physical activity are main factors to keep wellness and longevity but a combined method is still under developing.

Since ancient times, fasting has been performed for religious reasons or as a cure of diseases. Takahira⁴ was at the vanguard of fasting therapy in 1910-1920. He studied precisely the metabolic changes caused by fasting, and reviewed the efficacy of fasting therapy in various disease states. Mitsuo Koda⁵ developed fasting dietary therapy for various diseases, and confirmed beneficial effects for many patients with intractable diseases.

However, fasting method for healthy longevity or daily wellness has not been established. Our group had practiced macrobiotics for more than 10 years, and visited various fasting groups from 2005 to 2014.⁶ Upon these experiences we developed the teaching and practice system in 4-day “Wellness-fasting”. Daily nutritional intake was about 300 kcal by fermented vegetable juice (*Ko-so*). Many women had light headache in daily life, which became worse during fasting, but finally it disappeared, and substituted to vivid and active feeling to do something.

Our method could encourage participants to be a leader of health promotion by combining foods and health, and spiritual life. In this paper, we summarized the results of about 160 participants from October 2014 to December 2015.

METHODS

Subjects

About 20 healthy volunteers each time who wanted to learn wellness fasting by the ARSOA program. Data were collected from October 2014 to December 2015. Total number of participants in 12 courses was 161. Number of males was 36 and females 125. Age ranged from 20 to 74, averaging 46 years. Inclusion criteria to participate the program were healthy adults in any age in both sex, and exclusion criteria were diseased patients receiving drug therapy for cardiovascular disease, diabetes, chronic infectious diseases, gastrointestinal (GI) tract diseases, cancer and pregnant women.

Persons who wanted to participate in the program were telephone-interviewed by the expert staff about their health and willing to the program. All participants were requested to send

1 week dietary records and health check sheet, including past history, abnormal laboratory data, habitual health foods and/or supplements, and any question to the counselor.

All participants signed the agreement sheet after precise explanation of the program.

The program had been approved by the Ethical Committee in the Life Science Promotion Association.

Program

The 4 day wellness fasting program is shown in Table 1. All participants gathered at the Relache Holistic Center in *Megami-no-mori*, in Hokuto City, Yamanashi prefecture. For safety of the participants, nurses, athletics leaders, registered dietitians, and supportive staffs were joined in the study. For acute illness, near doctors in Suwa Central Hospital were contracted to treat sickness or unexpected accident.

The participants registered at noon on the first day. After check-in, health check-up was done by the Body Composition Analyzer (Tanita, Tokyo, Japan) which measured body weight, fat volume, muscle volume, water contents, estimated bone weight, basal metabolic rate and body mass index (BMI), based upon the electric impedance. Blood pressure and pulse rate were measured by Omron HEM-7021 (Kyoto, Japan), and abdominal circumference was measured by a scale meter.

Each participant was requested to fulfill the health check-up sheet, including subjective psychological symptoms by 3 category (not feel, feel, strongly feel), such as headache, hungry, GI distress, nausea, fatigue, disgust or depression, general condition, vivid feeling, activity and skin condition.

Hour	1 st day	2 nd day	3 rd day	4 th day
5:00		Drink <i>ko-so</i> , Respiration facing the rising sun	Drink <i>ko-so</i> , Respiration facing the rising sun	Drink <i>ko-so</i> , Respiration facing the rising sun
7:00		Free time	Free time	Free time
8:00		Health seminar 2. physical activity	Health seminar 3. oil intake	Health seminar 4. diet after fasting
9:00		Macrobiotics	Leader course	
9:35		Drink time	Drink time	
10:00		Athletic program 1. walking to the rainbow farm	Athletic program 2. walking to the shrine	Report writing and closing celemony
12:00	Registration	Juice making by organic vegetables	Vegetable juice	
13:30	Health check-up	Practice: hand healing	Practice: hand healing	
14:00	Stretch & walking in nature	DVD “ <i>Forks over knives</i> ”	DVD and discussion	
16:00	Health Seminar 1. wellness fasting	Lecture and Q&A		
17:00	Drink time	Drink time	Drink time	
18:00	Writing on health check sheet	Relaxation time	Relaxation time	
19:00	Adjourn (Hotel relache)	Adjourn (Hotel relache)	Adjourn (Hotel relache)	

Table 1: ARSOA wellness fasting schedule.

After health check-up participants received the orientation for the fasting, stretch movement, walking, and relaxation. Next morning wake-up time was early to practice meditation toward the rising sun. Health check-up and intake of 50 ml fermented vegetable juice, *ko-so*, Cell Energy (multivitamins), and mineral tablets followed. After free time, 2 seminars for physical activity, and test for individual physical movement, including slow training and stretch were done.

On the 2nd day morning respiration and meditation facing to the rising sun or blue light were performed outside in early morning. Then, the seminar on diet, nutrition, cooking and health based upon the macrobiotics were carried out.

In the afternoon practice of hand healing was taught, and had discussion time about the food and health by seeing the DVD “*Forks over knives*”. At evening, relaxation stretch, self-massage and meditation were practiced. In free time and night before sleep, participants could use foot spar, radon vapor bath, oil massage and walking in the nature around the hotel. As hotel facilities, foot bath, radon hormisis room and ordered massage were available in free time.

On the 3rd day, the schedule was repeated. Furthermore, music therapy and a field trip to the organic farm were carried out. Some vegetables harvested at the farm were used to make organic vegetable juice.

On the last day, attention to return to normal diet was taught, and the subjects ate half volume of boiled brown rice and vegetable soup as a brunch. All participants were requested to report their health condition after returning home (6th day and 1 month later).

Dietary intake during fasting: Each day, 2 litre bottle of water was recommended to drink. About 300 kcal was taken from 20-50 ml concentrated fermented vegetable juice (*Ko-so*) drink 3 times a day (Table 2).

Although intake of major nutrients were severely restricted, combination of Cell Energy (LIF origin, Japan) and Mineral (LIF origin) provided enough vitamin and minerals compared to the Dietary Reference Intakes (DRI 2010). High

antioxidant activity of *Ko-so* may give additional benefits for detoxication. In addition, a cup of warm soup made from dry mushroom and radish was supplied every evening before sleep. Hot water and tea were freely available.

Statistical Analysis

All data were collected in the excel database, and transferred to SPSS version 20 (IBM SPSS, Tokyo, Japan). Non-parametric variables, such as mood, were replaced to categorical variables. Significant level was set at $p < 0.05$. We also used structural equation modeling (SEM) to examine presumptive underlying variables by AMOS version 19 for Windows (IBM Inc.). The analysis was performed using cross-lagged effects variation model with longitudinal data followed over one month. Estimation of the best fitting model was carried out by the method of maximum likelihood of SEM. Results were regarded as statistically significant if the p values was less than 0.05.

RESULTS

The anthropometric data, blood pressure, pulse rate and body temperature are shown in Table 3. Age of participants ranged from 20 to 74, and most participants were women, who were working mostly in cosmetic shops as a sales lady or owners.

There were no current smokers. Their lifestyle was healthy and about half of them were ovo- and fish-vegetarians. BMI, blood pressure, body composition and body temperature were all within the normal range.

Changes of body weight, BMI, fat percent, blood pressure and pulse rate during 4 day wellness fasting is shown in Table 4. Body weight was lost 2.6 kg in males and 1.7 kg in females at median. Body fat rate decreased 1.3% and 0.7% in males and females, respectively, and muscular weight decreased 1.4 kg in males and 0.8 kg in females.

Systolic blood pressure decreased 12 mmHg in both males and females, and 5 mmHg and 6 mmHg in diastolic pressure in males and females, respectively. On the contrary, the pulse rate increased 10 in males and 7.5 in females at median. Body temperature decreased 0.2-0.3 °C in both sex.

	Energy	Protein	Lipid	K	Ca	Mg	Mn	Zn	Se	Fe	Vit A	Vit D	Vit B ₁	Vit B ₂	Vit B ₆	Vit C	Dietry Fiber
	kcal	g	g	mg	mg	mg	mg	mg	µg	mg	µg	µg	mg	mg	mg	mg	g
Ko-so 150 ml	188	1.1		353	68	32	0.32	0.2		1.4	12		0.05	0.03	0.17	7	0.5
Mineral tab 5 tab	1.8	0.02	0.04		300	300	0.08	15	20	0.8							
Cell-Energy 3 pack	72	0.6	0.3	66	124	8	0.03	0.02		0.3		57	6.6	4.5	9.2	300	4.2
Carrot juice 65 ml	65	0.8	0.3	355	30	13		0.3		0.3	721		0.08	0.06	0.82	28	3.6
Total	327	2.52	0.64	775	522	353	0.43	15.5	20	2.8	733	57	6.33	4.59	8.19	335	8.3
DRI [†]	1950	50		2000	600	290				6.5	700		1.1	1.2	1.1	100	17

Ko-so contains 1.6 g galactooligosaccharide and has 1700 µM TE (AOU unit)

[†]DRI: Dietary Reference Intake 2010 for middle aged women.

Table 2: Nutrients intake during fasting per day.

	Male (n=36)	Female (n=36)
	mean±sd	mean±sd
Age (year)	43.4±8.3	46.9±13.0
Height (cm)	170.6±4.2	158.7±5.2
Body weight (kg)	67.1±8.5	55.3±8.5
BMI (kg/m ²)	23.1±2.9	22.0±3.3
Fat percent (%)	21.1±4.9	31.1±6.0
Muscular weight (kg)	49.8±4.2	35.3±3.3
Systolic BP (mmHg)	129.1±15.1	123.3±20.9
Diastolic BP (mmHg)	85.3±12	91.9±13.0
Pulse rate (/min)	73.6±12.9	74.6±11.2
Body temperature (°C)	36.4±0.4	36.3±0.4

Table 3: Anthropometric data of participants.

	Males (n=31)		Females (n=111)	
	median	(25.75 percentile)	median	(25.75 percentile)
Body weight (kg)	2.6	(1.9, 3.0)	1.7	(1.4, 2.2)
BMI (kg/m ²)	0.9	(0.7, 1.0)	0.7	(0.6, 0.9)
Fat percent (%)	1.3	(0.1, 2.0)	0.7	(-0.5, 2.0)
Muscular weight (kg)	1.4	(0.8, 1.7)	0.8	(0.2, 1.4)
Systolic BP (mmHg)	12	(3.5, 22.0)	12	(5.3, 22.3)
Diastolic BP (mmHg)	5.0	(-1.3, 11.5)	6.0	(0.0, 10.6)
Pulse rate (/min)	-10	(-17, 2.0)	-7.5	(-15, 2.0)
Body temperature (°C)	0.2	(-0.1, 0.4)	0.3	(0.3, 0.8)

Table 4: Reduction of body weight, BMI, fat percentage, blood pressure and pulse rate during 4 days wellness fasting.

Changes of self-reported condition during 4 days are shown in figures (Figures 1 and 2). Slight headache was a complaint of about one third women, and the prevalence increased toward 3rd day, but it decreased thereafter to only 10% in females. Hungry was highly recognized among males, but high prevalence was only 2 days. Feeling of coldness was common complaint of women, and it improved only 15%. GI tract distress was rather stationary around 20%. Vivid feeling and activity increased toward the end of fasting. In males increase of vivid feeling was remarkable at day 4 and day 6. Active feeling and vivid mood were significantly associated with skin condition.

Hungry, GI distress and feeling of emesis were significantly associated with fat, muscle weight reduction and decreased BMI. General condition, sleepy feeling, fatigue, depressive feeling, headache, cold feeling, GI distress and hunger were varyingly interrelated. Structure Equation Model by AMOS showed that a significant multiple effects of body fat rate, obesity, body weight, muscle volume and systolic blood pressure at day 2 and day 3 was recognized to those at day 4 (Figure 3).

Subject symptoms, such as skin condition, hungry, cold feeling, GI distress and headache 1 month later was significantly influenced by those of day 2 (Figure 4).

Symptoms, mood and body changes interacted and became better in later days.

DISCUSSION

In 1999, during the International Year of Older Persons, World Health Organization (WHO) launched a new campaign highlighting the benefits of Active Ageing.⁷ This was in perfect harmony with the slogan for the International Year “Towards a Society or All Ages” as Active Ageing highlights the importance of social integration and health throughout the life course. Dr. Gro-Harlem Brundtland, Director General of WHO stated “*there is much the individual can do to remain active and healthy in later life*”. The right life style, involvement in family and society and a supportive environment for older age all preserve well being.

It is important to make strategies required at the services delivery level and possible tools for implementation. Integrated organization by various health providers, such as physicians, nurses, dieticians, physical exercise trainers, pharmacists, therapists, and others, work together putting people at the center.³ It should be important to set standards for team-based care through multidisciplinary learning based upon the theoretical and practical learning.

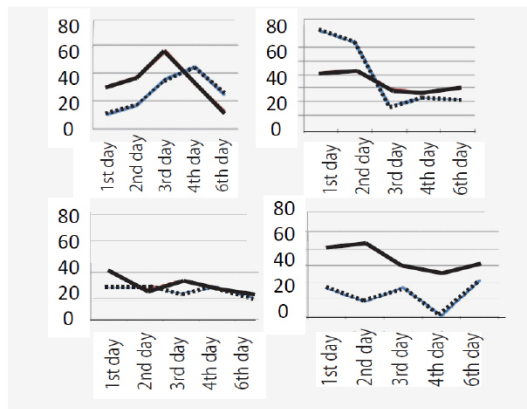


Figure 1: Prevalence of headache (upper left), Feeling of Hungry (upper right), Prevalence of GI distress (lower left), and Cold feeling (lower right). Solid line: female, dot line: male. Vertical axis; prevalence rate (%).

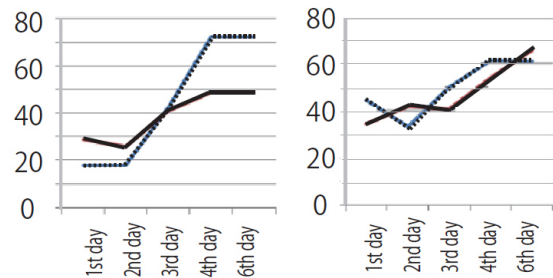


Figure 2: Prevalence rate of good condition (left) and feeling of activities (right). Vertical axis; prevalence rate (%).

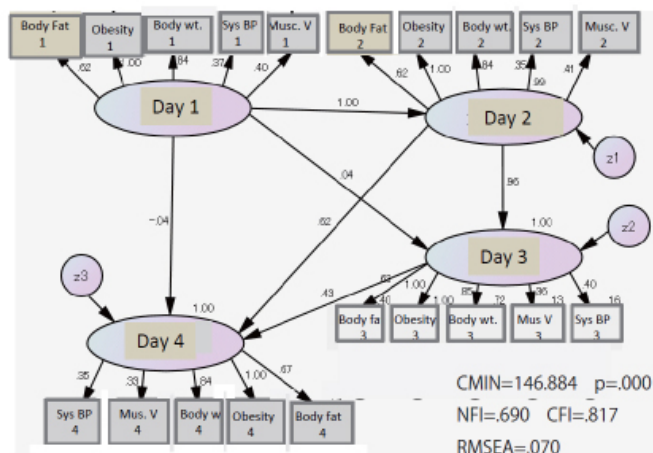


Figure 3: Causal structure of objective physical health by using structural equation modeling. Physical health of day 4 is influenced by day 2 and day 3.

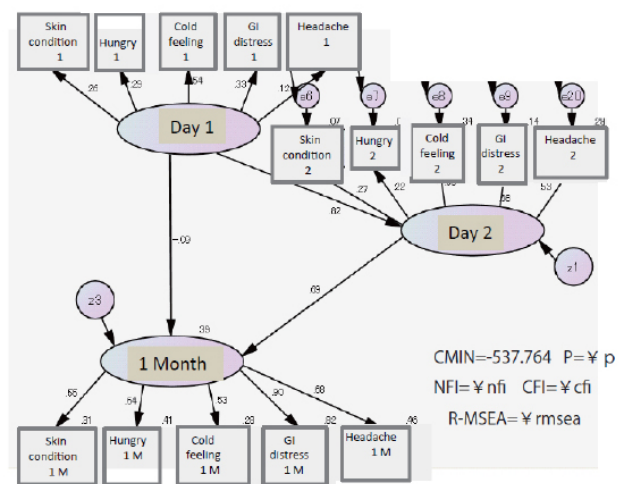


Figure 4: Causal structure of subjective health by using structural equation modeling. About 60% of subjective health 1 month later could be explained by the conditions on day 2.

In response to increasing rates of obesity and associated chronic disease, Japan has implemented several policies, guidelines and programs. *Kenkou Nippon 21* (Health Japan 21) began in 2000,⁹ followed by the *Shokuiku* (food and nutrition education) Basic Law which was passed in 2005.^{10,11} Subsequently, in 2008, the government launched a special health check-up (*tokutei kenkou shinsa*), involving measurement of waist circumference and nutrition counseling to reduce metabolic syndrome.¹²

However, despite of these programs and guidelines, obesity remains a public health problem in Japan. In addition, discrepancy between lifespan and healthy life expectancy causes another problem by huge expansion of medical cost.¹³ The difference was nearly 12 years for women and 10 years for men, and it is not shrunken despite of the implementation of various health strategies for elderly care.

Various dietary therapies to control health and body weight have been proposed, such as macrobiotics, Atkins diet, Zone diet, Ornish Diet, Learn Diet, etc.¹⁴ We had supported basi-

cally Macrobiotics,⁶ and elaborated to take the balance of food, physical activity and mind to achieve a spiritual life. It is relevant of the Koda's fasting therapy,⁵ in which unpolished brown rice and green vegetable paste constitute the basic regimen, and it improves the intestinal environment by resolving constipation. Koda's method could repair the balance of autonomic nervous system, so it may not only be effective for gastrointestinal disease, but also for some neurodegenerative diseases.

Although control of total energy intake is essential to control obesity, individual awareness and practice are also important.¹⁴ We developed a weight loss program based on a behavioral approach with dietary and exercise intervention (*Saku Control Obesity Program (SCOP)*) in Japan.¹⁵⁻¹⁷ In this program, we emphasized individually-tailored counseling, instead of uniform class room teaching, and the diet and physical activity were designed for each participant.¹⁸⁻²⁰ Half participants succeeded to reduced more than 5% body weight, and to change to the good lifestyle.

In ARSOA Wellness Fasting method is the combination of a low-energy vegetarian diet (about 300 kcal fermented vegetable juice per day, and multivitamin and mineral supplement), physical exercise (walking, slow training and stretch), meditation, foot spar, radon hormisis, and self massage with/without oil to stimulate the self-healing capacity. Using this regimen, a new concept of fasting for healthy longevity would be established.

The changes of mood were related to the body change. Headache was the most popular symptom, as one 3rd female participants had slight headache at registry, but it remarkably improved after fasting. Hungry and GI distress, nausea appeared on the second and 3rd day, but these improved toward the end. Blood pressure and fat percent significantly decreased by fasting, and body temperature tended to become lower. The active and vivid feeling increased on fourth day, and it lasted even at one month later.

It has been shown that a few days fasting caused many metabolic changes including various hormones and free fatty acid.²¹ The altered metabolism by fasting needs further study, because fasting seems to cause switch fuel from carbohydrate to fatty acid, as shown by the increase of ketone bodies in the urine.²² Cahill²³ studied metabolic changes during 40 days of starvation and found that β -hydroxybutyrate replaces glucose as a source of energy. Fasting causes many metabolic changes.²⁴

We suggested the contribution of intestinal microbiota was also important.²⁵ We considered the increased β -hydroxybutyrate should influence on both mental and somatic symptoms. Butyrate made by intestinal microbiota could be metabolized to β -hydroxybutyrate in the body, so these should be further studied in the near future.

ACKNOWLEDGEMENTS

The authors thank to participants and many staffs of wellness fasting for their cooperation. The study was supported by the ARSOA Educational Program.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

REFERENCES

1. WHO. SAGE publications: Meeting reports and presentations. 2012. Web site. http://www.who.int/healthinfo/sage/meeting_reports/en. Accessed April 9, 2016.
2. Oeppen J, Vaupel JW. Demography, broken limits of life expectancy. *Science*. 2002; 296(5570): 1029-1031. doi: [10.1126/science.1069675](https://doi.org/10.1126/science.1069675)
3. WHO methods for life expectancy and healthy life expect-

tancy. Global Health Estimates Technical Paper WHO/HIS/HSI/GHE/2014.4. Geneva, Switzerland: World Health Organization; 2014. Web site. http://www.who.int/healthinfo/global_burden_disease/GlobalCOD_method_2000_2012.pdf. Accessed April 9, 2016.

4. Takahira H. *Study on Fasting*. Tokyo, Japan: Iwanami Book Pub; 1999.

5. Watanabe S. Japanese longevity and dietary life: Mitsuo Koda. *Clin & Funct Nutriol*. 2012; 4: 148-150.

6. Kushi M, Blauer S, Esko W. *The Macrobiotic Way: The Complete Macrobiotic Lifestyle Book*. USA: Avery; 2004.

7. Population Division. World Population Prospects, the 2015 revision (WPP2015). Department of Economic and Social Affairs of the United Nations Web site. <https://esa.un.org/unpd/wup/>. Accessed October 15, 2016.

8. Ministry of Health, Labour and Welfare, MHLW. Section 3. Measures against Lifestyle-Related Diseases through “Health Japan 21” and Promotion of “Shokuiku (food and nutrition education)”. 2008. Web site. <http://www.mhlw.go.jp/english/wp/wp-hw2/part2/p2c1s3.pdf>. Accessed October 15, 2016.

9. CAO. Shokuiku Basic Law and Shokuiku Promotion General Plan. Cabinet Office of Japan. 2012.

10. Watanabe S. Changes in dietary habits in Japan: Background of Shokuiku and its promotion. *Clin Funct Nutriol*. 2010; 2: 9-14. Web site. <http://ci.nii.ac.jp/naid/40017412477/>. Accessed October 15, 2016.

11. Udagawa K, Miyoshi M, Yoshiike N. Mid-term evaluation of “Health Japan 21”: Focus area for the nutrition and diet. *Asia Pac J Clin Nutr*. 2008; 17(S2): 445-452. Web site. <http://apjcn.nhri.org.tw/server/APJCN/17%20Suppl%202//445.pdf>. Accessed October 15, 2016.

12. Ministry of Health, Labour and Welfare. 2016. Web site. <http://www.mhlw.go.jp/bunya/shakaihoshoh/iryouseido01/info02a-2.html>. Accessed October 15, 2016.

13. Ministry of Health, Labour and Welfare. *Health and Medical Services: Health care Insurance System*. 2016. Web site. <http://www.mhlw.go.jp/english/wp/wp-hw9/dl/02e.pdf>. Accessed October 15, 2016.

14. Hirakawa A, Melby M, Watanabe S. Comprehensive food labeling for obesity control. *Adv Obes Weight Manage Control*. 2016; 4(3): 88. doi: [10.15406/aowmc.2016.04.00088](https://doi.org/10.15406/aowmc.2016.04.00088)

15. Nakade M, Aiba N, Suda N, et al. Behavioral change during weight loss program and one-year follow-up: Saku Control Obesity Program (SCOP) in Japan. *Asia Pac J Clin Nutr*. 2012; 21(1):

22-34. Web site. <http://apjcn.nhri.org.tw/server/APJCN/21/1/22.pdf>. Accessed October 15, 2016.

16. Watanabe S, Morita A, Aiba N, et al. Study design of the Saku Control Obesity Program (SCOP). *Anti-Aging Med.* 2007; 4: 70-73. doi: [10.3793/jaam.4.70](https://doi.org/10.3793/jaam.4.70)

17. Kawashima N, Watanabe S, Morita A, Aiba N, Miyachi M. Changes of fat volume and Adipocytokines by the randomized intervention program for obesity control program (SCOP). *Diabetes Res Open J.* 2015; 1(5): 136-146. doi: [10.17140/DROJ-1-122](https://doi.org/10.17140/DROJ-1-122)

18. Prochaska JO, Velicer WF. The transtheoretical model of health behavior change. *Am J Health Promot.* 1997; 12(1): 38-48. doi: [10.4278/0890-1171-12.1.38](https://doi.org/10.4278/0890-1171-12.1.38)

19. Nakade M, Aiba N, Suda N, et al. Behavioral change during weight loss program and one-year follow-up: Saku Control Obesity Program (SCOP) in Japan. *Asia Pac J Clin Nutr.* 2012; 21(1): 22-34. Web site. <http://apjcn.nhri.org.tw/server/APJCN/21/1/22.pdf>. Accessed October 15, 2016.

20. Nakade M, Aiba N, Morita A, Miyachi M, Sasaki S, Watanabe S. What behaviors are important for successful weight maintenance? *J Obes.* 2012; 202037. doi: [10.1155/2012/202037](https://doi.org/10.1155/2012/202037)

21. Osame M. Hormonal change during 3 day starvation with/without glucose loading test. *Clin Funct Nutriol.* 2010; 2: 331-335.

22. Watanabe S, Hirakawa A, Aoe S, Fukuda K, Muneta T. Basic ketone engine and booster glucose engine for energy production. *Diabetes Res Open J.* 2016; 2(1): 14-23. doi: [10.17140/DROJ-2-125](https://doi.org/10.17140/DROJ-2-125)

23. Cahill GF Jr. Starvation in man. *New Engl J Med.* 1970; 282: 668-675. doi: [10.1056/NEJM197003192821209](https://doi.org/10.1056/NEJM197003192821209)

24. Keys A. *The Biology of Human Starvation*. Minneapolis, Minnesota, USA: University of Minnesota Press; 1950: 2.

25. Hirakawa A, Watanabe S, Tanaka H. Koda's fasting therapy: Energy balance and intestinal bacteria flora. *Adv Food Technol Nutr Sci Open J.* 2015; 1(5): 112-123. doi: [10.17140/AFTNSOJ-1-120](https://doi.org/10.17140/AFTNSOJ-1-120)