ISSN. 2338-7475
E-ISSN. 2620-7869
Hearty
Jurnal Kesehatan Masyarakat
Beriman, Tulus, Sepenuh Hati,Berbesar Hati, Jujur, Sehat dan Kuat
Vol. 14 No. 2, April 2026, Hal. 360-367

RISK FACTOR ANALYSIS OF PREDIABETES COLLAGE STUDENTS AT THE UNIVERSITAS PENDIDIKAN INDONESIA

Muhamad Jehan Ramadhan, Widya Astuti *, Delita Septia Rosdiana, Isti Kumalasari
Nutrition Program, Faculty of Sport and Health Education, Universitas Pendidikan Indonesia
Jl. Dr. Setiabudi No. 229, Bandung City, West Java 40154, Indonesia
Email: widyaastuti@upi.edu

Abstract

Prediabetes is a condition in which blood plasma glucose levels are higher than normal, but still lower than diabetes mellitus levels. This study aimed to determine the factors influencing the occurrence of prediabetes among students at the Indonesia University of Education. The research used a case-control design with a quantitative approach, involving 82 participants selected through purposive sampling, consisting of 41 individuals in the case group and 41 in the control group. Data were obtained through interviews using a structured questionnaire for respondent characteristics and physical activity, SQ-FFQ to assess the consumption pattern of sweet foods and drinks, and measurements of blood glucose levels and nutritional status using a glucometer, weighing scale, and stadiometer. Data analysis was conducted using Chi-Square and logistic regression tests. The habit of consuming sweet foods and beverages showed a significant association with prediabetes (p-value = 0.014), with a six times higher risk of prediabetes. Peer influence had an effect on prediabetes (p-value = 0.021) with a five times higher risk. Physical activity was associated with prediabetes (p-value = 0.045) with a four times higher risk. Nutritional status was associated with prediabetes (p-value = 0.001) with a 26 times higher risk. These findings indicate that the causes of prediabetes among students at the Indonesia University of Education are the habit of consuming sweet foods and drinks, peer influence, physical activity, and nutritional status. Nutritional status is the greatest risk factor causing prediabetes.

Keywords: Collage Students, Nutrition Status, Prediabetes, Sugar Sweened Beverages

Introduction

Prediabetes is a condition characterized by elevated blood glucose levels that are above normal but still lower than those found in diabetes mellitus (Rogers et al., 2023). Prediabetes can be identified through various examinations, such as a HbA1C level of 5.7%-6.5%, random blood sugar levels >140 – 199 mg/dL, and fasting blood sugar levels of 100-125 mg/dL (Perkeni, 2021). The results of the 2023 Indonesian Health Survey indicate that the prevalence of prediabetes among individuals aged 15 years and older, based on random and fasting blood sugar tests, is 18.6% and 13.4% respectively (SKI, 2023). The prevalence of diabetes mellitus in West Java Province is 2.2% (Dinkes Jabar, 2022), while in Bandung City, 44,333 people or about 98.7% of diabetes mellitus patients have received healthcare services according to standards (Dinkes Kota Bandung, 2022). A screening conducted among students at the Indonesia University of Education identified that 32 out of 50 students were found to have prediabetes.

Prediabetes can be influenced by two factors, namely unchangeable factors and modifiable factors. Modifiable factors include age, gender, and genetics. Age is an unchangeable factor, caused by the decline in organ performance such as the pancreas with increasing age (Wang & Zheng, 2020).

Submitted: September-2025 Received: February-2026 Available Online: April-2026

In addition, genetic factors are related to the presence of hereditary disorders or genetic predispositions towards insulin resistance or dysfunction of pancreatic beta cells.

Unmodifiable factors include nutritional status, dietary patterns, and physical activity. Nutritional status is related to body weight. Individuals who are obese tend to have high fat accumulation that can disrupt pancreatic function and increase the risk of prediabetes (Sun et al., 2022). Excessive consumption of sweet foods and drinks can increase calorie and sugar intake. If not used as energy, it will be stored as fat. Fat can lead to obesity and reduce the body's sensitivity to insulin (Vajravelu et al., 2022). Lack of physical activity that leads to a sedentary lifestyle is a risk factor for prediabetes, so it is recommended to engage in physical activity for at least 150 minutes per week (Perkeni, 2021). The novelty of this research is involving students who are categorized as young adults as respondents, examining the frequency of consumption of sweet foods and beverages, and the status of prediabetes is evidenced by random blood sugar tests.

Method

This research employed a quantitative approach with an observational case-control design and utilized purposive sampling. The research was conducted in February 2025 at the Universitas Pendidikan Indonesia, located in Bandung City, West Java. The study population comprised undergraduate students from the university, with a total of 82 participants selected 41 in the case group and 41 in the control group.

Data collection was carried out using a structured questionnaire to gather information on peer influence, and respondents' physical activity. Blood glucose levels were assessed using a glucometer at the time of data collection, with sample collection performed by a certified phlebotomist. Body weight and height were measured using a digital scale and a stadiometer, respectively. Additionally, a semi-quantitative food frequency questionnaire (SQFFQ) was used to assess participants consumption patterns of sweet foods and beverages in terms of quantity and frequency.

The data obtained were processed using the Statistical Program for Social Science (SPSS) version 21, with multiple logistic regression analysis employed. The independent variables in this study included sweet food and beverage consumption habits, peer influence, physical activity, and nutritional status, while the dependent variable was the respondents' health status. Ethical approval for this study was granted by the Research Ethics Committee of Universitas Respati Yogyakarta, as stated in Decision Letter No: 016.3/FIKES/PL/II/2025 dated February 14, 2025.

Results

Table 1. Distribution Respondent Based on Health Status

Category	Health Status			
	Prediabetes		Normal	
	n	%	n	%
Sweet Foods and Beverages				
Excessive (sweet food consumption>50 g/day and beverages >480 ml/day)	31	75,6	13	31,7
Normal (sweet food consumption<50 g/day and beverages <480 ml/day)	10	24,4	28	68,3
Average ± std	**68,8 ± 48,8**			
Role of Peers				
Influential (Scor > 3)	30	73,2	8	19,5
Does not have an impact (Scor < 3)	11	26,8	33	80,5
Average ± std	**3,7 ± 1,3**			
Physical Activity				
Light (1,4 ≤ PAL ≤ 1,69)	24	58,5	14	31,4
Moderate (1,7 ≤ PAL ≤ 1,99)	17	41,5	27	65, 9

Average ± std		**1,5 ± 0,43**		
Nutrition Status				
overweight (25,1-27,0 kg/m^2)	35	85,4	8	19,5
Normal (18,5-25,0 kg/m^2)	6	14,6	33	80,6
Average ± std		**23,6 ± 4,1**		

Table 1 shows that respondents who have a habit of consuming sweet foods and beverages excessively (>50 grams/day and beverages >480 ml/day) consist of 31 people (75.6%) from the case group and 13 people (31.7%) from the control group, with an average sweet food and beverages consumption in both groups of 68.6 grams/day and 323,8 ml/day. Based on the table above, a total of 38 people (46.3%) from both groups stated that peers have an influence on the consumption choices of sweet foods and drinks. This influence is more dominant in the case group, with 30 respondents (73.2%) giving scores above 3, while in the control group only 8 respondents (19.5%) gave similar scores. Overall, the average score for peer influence assessment is 3.7. A total of 24 people (58.5%) in the case group and 14 people (31.4%) in the control group had a light physical activity category. The average physical activity in both groups was light with a PAL value of 1.5. A total of 35 people (85.4%) from the case group and 8 people (19.5%) from the normal group had an overweight nutritional status.

Table 2. Frequency of Consumption of Sweet Foods and Beverages

Frequency	**Health Status**			
	Prediabetes		**Normal**	
	n	**%**	**n**	**%**
>3 time/day	3	7.3	2	4,9
1 times/day	28	68.3	12	29,3
3-6 times/week	5	12.2	7	17,1
1-2 times/week	3	7.3	15	36,6
1-2 times/week	2	4.9	5	12,2

The frequency of consumption of sweet foods and beverages is most commonly done in the case group, which is once a day (68.3%), indicating a fairly regular consumption pattern. In contrast to the case group, the average consumption habit of sweet foods and beverages in the control group is 1-2 times a week (36.6%), indicating an irregular consumption pattern.

The results of the multivariate analysis on the variables of sweet food and beverage consumption habits, peer influence, physical activity, and nutritional status are as follows.

Table 3. Results Relationship Between Variabels

Variable	***p value***	**OR**	**95%CI**
Excessive sweet food and beverages consumption	0.014*	6,7	1,481-30,411
The role of peers	0.021*	5,3	1,290-22,035
Light physical activity	0.045*	4,6	1,039-21,052
Nutrition status overweight	0,001*	26	5,714-81,543

**Logistic regression test (significance p-value <0,05)*

The table shows that the highest odds ratio (OR) is found in the nutritional status variable compared to other variables. An OR value > 1 indicates a positive relationship, meaning that this variable increases the likelihood of prediabetes occurring, while an OR value < 1 indicates a negative relationship with the occurrence of prediabetes. Overall, all variables have a significant relationship with prediabetes.

Discussion

Relationship Between Consumption Habits of Sweet Foods and Beverages with Prediabetes

Research results indicate a relationship between the consumption habits of sweet foods and beverages and the incidence of prediabetes. This is in line with the study by Putra et al. (2021), which shows a significant relationship between excessive consumption habits of sweet foods and beverages and the occurrence of prediabetes (Putra et al., 2021). Respondents with a habit of consuming sweet foods and beverages excessively (>50 grams/day and >480 mL/day) have a six times higher risk of developing prediabetes compared to respondents who consume in normal amounts. This finding is in line with the research results of Moon et al. (2022) which reveal that respondents who consumed sweet foods >50g/day and sweet drinks >480ml/day are at risk of experiencing prediabetes (Moon et al., 2022).

The sweet foods and beverages that are frequently consumed by the respondents are sweet cakes, martabak, dessert boxes, wafers, cookies, instant sweet drinks, syrups, and trending drinks that contain a lot of added sugar with a frequency of 1 times/day. Based on the research results Rosita (2023) the glucose content in contemporary drink samples ranges from 5 to 66.5 grams, while the sucrose content ranges from 1 to 26 grams. The total sugar content in these drinks was recorded to be between 23 to 70 grams. This research reveals that there are two drink samples that exceed the recommended daily sugar intake limit of 50 grams, as regulated by the Indonesian Minister of Health Regulation Number 30 of 2013 (Rosita, 2023). In addition, sweet foods such as dessert boxes contain sugar ranging from 38 to 48 grams in packaging sized 120g (Calcount, 2025).

The most added sugar in sweet foods and beverages is sucrose, which contains glucose and fructose (Komaruddin & Mukhlas, 2024). This sugar content can increase the risk of developing prediabetes if consumed excessively (Tarmizi & Siregar, 2024). Excess sugar intake can increase fat levels in the liver through a process called lipogenesis, which is the formation of fatty acids and triglycerides from glucose that occurs in adipose tissue (Wagner et al., 2023). The accumulation of fat in the liver can trigger hepatic insulin resistance. If this condition persists, the body may experience a decrease in sensitivity to insulin, leading to a state of prediabetes (Smith et al., 2020). In addition, the sugar content in sweet foods and drinks can rapidly increase blood glucose levels, prompting the pancreas to produce more insulin (Meng et al., 2021). If this condition occurs continuously, it can cause insulin resistance which leads to prediabetes (Jayanti et al., 2021).

Relationship Between Peers and Prediabetes

Research results show there is a relationship between peers and the occurrence of prediabetes. Peers can influence the consumption habits of sweet foods and beverages that lead to the onset of prediabetes. This is because peers have an impact in providing information and encouraging respondents to choose sweet foods and drinks. In addition, peers often bring sweet foods and drinks when gathering together. This is what causes an increase in the consumption of sweet foods and drinks. This finding is in line with the research results of Gligorić et al. (2021), which indicates that there is an influence of peers on the decision-making process in choosing certain foods and drinks (Gligorić et al., 2021).

Respondents influenced by peers in choosing sweet foods and beverages have five times higher risk of developing prediabetes compared to respondents who are not influenced by peers. This is due to the role of peers in shaping consumption habits of sweet foods and beverages, which can ultimately increase the risk of prediabetes (Saputri et al., 2021). These findings are in line with research results showing that peer eating habits influence individual consumption patterns (Fawziya et al., 2024). Respondents who have peers with healthy eating patterns tend to adopt those habits, while those who associate with peers who have unhealthy eating habits are more likely to be influenced to adopt similar consumption patterns (Chung et al., 2020).

Relationship between Physical Activity and Prediabetes

Research findings indicate a relationship between physical activity and the occurrence of prediabetes. Based on the research results, there were respondents who had moderate and light physical activity habits. The types of physical activities that are often performed in the control group include studying, sweeping, and mopping, while the types of exercises commonly done are push-ups, sit-ups, running, and weightlifting with an average duration of more than 1 hour/day, classified as moderate physical activity. The majority of respondents in the case group have light physical activity. The physical activities that are often performed by respondents in the case group include watching television and chatting with an average duration of more than 2 hours/day, while the exercises frequently done are push-ups and running with a duration of less than 1 hour/day.

Respondents with light physical activity have four times the risk of developing prediabetes compared to respondents who engage in moderate physical activity. This is consistent with the study by Syukri et al. (2022), which showed that respondents with low physical activity, with an intensity of less than three times a week, had higher blood sugar levels compared to respondents with moderate physical activity (Syukri et al., 2022). Low levels of physical activity can lead to a decrease in the number of glucose transporters (GLUT) in skeletal muscle tissue. GLUT plays a crucial role in the process of glucose absorption into muscle cells. A decrease in GLUT quantity impacts the body's ability to absorb glucose, thereby increasing blood glucose concentration and contributing to the onset of prediabetes (Sędzikowska & Szablewski, 2021). Additionally, low physical activity is also associated with increased accumulation of visceral fat due to limited energy expenditure. This visceral fat can trigger the release of free fatty acids, disrupting the glucose metabolism process, thus increasing the risk of developing prediabetes (Dhokte & Czaja, 2024).

Relationship between Nutritional Status and Prediabetes

Research findings demonstrate a significant association between nutritional status and the incidence of prediabetes. Individuals classified as obese are 26 times more likely to develop prediabetes compared to those with a normal nutritional status. This result is consistent with the study conducted by Aisyah et al. (2024), which also identified a correlation between nutritional status and the occurrence of prediabetes (Aisyah et al., 2024). The cause of obesity nutritional status in respondents is due to low physical activity habits, consumption habits of high-fat and high-sugar foods, as well as having midnight eating habits or night eating syndrome (NES). This is consistent with research by Hanifah et al. (2024) which shows that night eating syndrome habits have a significant relationship with the occurrence of obesity nutritional status (Hanifah et al., 2024).

The nutritional status of obesity in respondents can be influenced by a lack of physical activity and a diet high in sugar, which contributes to an increase in body mass index, thereby increasing the risk of developing prediabetes. These findings are in line with the research conducted by Arwani et al. (2023) which states that low levels of physical activity and a high-sugar diet are related to an increased risk of prediabetes in individuals with obesity nutritional status (Arwani et al., 2023). Obesity-related nutritional status is also known to trigger systemic inflammation due to the accumulation of body fat that produces pro-inflammatory cytokines. These cytokines can disrupt the pancreas's function in producing insulin, thereby increasing the occurrence of prediabetes (Ping et al., 2024).

Conclusion

Respondents with overweight or obesity nutritional status have a 26 times higher risk of developing prediabetes compared to those with normal nutrition. The habit of consuming sweet foods and beverages excessively increases the risk six times. The influence of peers in choosing sweet foods

and beverages also increases the risk by up to five times, while light physical activity increases the risk of developing prediabetes by four times compared to moderate or high physical activity. I recommend that the university should actively develop integrated health promotion programs, such as nutrition seminars, regular health check-ups, and the provision of sports facilities as well as canteens with low-sugar nutritious menus to support a healthy lifestyle on campus. Students are expected to raise awareness of healthy living through balanced diets, limiting sugar consumption, and regular physical activity, as well as creating a social environment that supports healthy behaviors.

References

[1] Aisyah, I. S., Neni, N., & Wardani, Y. S. (2024). The relationship of nutritional status and dietary pattern with the incident of prediabetes at productive age in the Mangkubumi, Tasikmalaya city, Indonesia. *Nutrición Clínica y Dietética Hospitalaria*, *44*(4). https://doi.org/10.12873/444aisyah

[2] Arwani, A., Widiyanto, B., & Widiyati, S. (2023). Effectiveness of Different Physical Activities toward Glycemic Control in Prediabetes Mellitus Clients. *JENDELA NURSING JOURNAL*, *7*(1), 53–62. https://doi.org/10.31983/jnj.v7i1.9876

[3] Calcount. (2025). *Calories in Lindt Creation Dessert Gift Box*. https://www.caloriecounter.com.au/food/lindt-creation-dessert-gift-box

[4] Chung, S. J., Ersig, A. L., & McCarthy, A. M. (2020). The Influence of Peers on Diet and Exercise Among Adolescents: A Systematic Review. *Journal of Pediatric Nursing*, *36*, 44–56. https://doi.org/10.1016/j.pedn.2017.04.010

[5] Dhokte, S., & Czaja, K. (2024). Visceral Adipose Tissue: The Hidden Culprit for Type 2 Diabetes. *Nutrients*, *16*(7), 1015. https://doi.org/10.3390/nu16071015

[6] Dinkes Jabar, D. K. J. B. (2022). *Profil Kesehatan Jawa Barat Tahun 2022*. Dinas Kesehatan Jawa Barat.

[7] Dinkes Kota Bandung, D. K. K. B. (2022). *Profil Kesehatan Kota Bandung Tahun 2022*. Dinas Kesehatan Kota Bandung.

[8] Fawziya, V. R., Adi, M. S., Wurjanto, M. A., & Yuliawati, S. (2024). Hubungan antara Peran Teman Sebaya dan Paparan Media Sosial dengan Tingkat Konsumsi Minuman Berpemanis pada Remaja. *Amerta Nutrition*, *8*(3), 383–388. https://doi.org/10.20473/amnt.v8i3.2024.383-388

[9] Gligorić, K., White, R. W., Kiciman, E., Horvitz, E., Chiolero, A., & West, R. (2021). Formation of Social Ties Influences Food Choice. *Proceedings of the ACM on Human-Computer Interaction*, *5*(CSCW1), 1–25. https://doi.org/10.1145/3449297

[10] Hanifah, R. A., Wiboworini, B., & Budiastuti, V. I. (2024). Tren Konsumsi Minuman Manis Kekinian dan Efek yang Dirasakan Pada Remaja. *Temu Ilmiah Nasional*, *5*(1).

[11] Jayanti, A. K., Sufyan, D. L., Puspita, I. D., & Puspareni, L. D. (2021). Hubungan Konsumsi Sugar-Sweetened Beverages dan Pemesanan Makanan Online dengan Kadar Glukosa Darah Pekerja 25-44 Tahun di Perumahan Kasuari, Cikarang. *Ghidza: Jurnal Gizi Dan Kesehatan*, *5*(2), 221–230. https://doi.org/10.22487/ghidza.v5i2.213

[12] Komaruddin, & Mukhlas, F. (2024). Hubungan Konsumsi Sugar Sweetened Beverage, Aktivitas Fisik dan Tingkat Stres dengan Kejadian Prediabetes. *Jurnal Ilmiah Wahana Pendidikan*, *10*(8), 911–922. https://doi.org/10.5281/zenodo.11125542

[13] Meng, Y., Li, S., Khan, J., Dai, Z., Li, C., Hu, X., Shen, Q., & Xue, Y. (2021). Sugar- and Artificially Sweetened Beverages Consumption Linked to Type 2 Diabetes, Cardiovascular Diseases, and All-Cause Mortality: A Systematic Review and Dose-Response Meta-Analysis of Prospective Cohort Studies. *Nutrients*, *13*(8), 2636. https://doi.org/10.3390/nu13082636

[14] Moon, J.-Y., Hua, S., Qi, Q., Sotres-Alvarez, D., Mattei, J., Casagrande, S. S., Mossavar-Rahmani, Y., Siega-Riz, A. M., Gallo, L. C., Wassertheil-Smoller, S., Kaplan, R. C., & Corsino, L. (2022). Association of Sugar-Sweetened Beverage Consumption with Prediabetes and Glucose Metabolism Markers in Hispanic/Latino Adults in the United States: Results from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL). *The Journal of Nutrition*, *152*(1), 235–245. https://doi.org/10.1093/jn/nxab334

[15] Perkeni. (2021). *Pengelolaan dan Pencegahan Diabetes Melitus Tipe 2 di Indonesia*. PB Perkeni.

[16] Ping, W.-X., Hu, S., Su, J.-Q., & Ouyang, S.-Y. (2024). Metabolic disorders in prediabetes: From mechanisms to therapeutic management. *World Journal of Diabetes*, *15*(3), 361–377. https://doi.org/10.4239/wjd.v15.i3.361

[17] Putra, E. S., Junita, J., & Siregar, S. (2021). Konsumsi minuman manis prediktor risiko prediabetes remaja Kota Jambi. *Riset Informasi Kesehatan*, *10*(2), 89. https://doi.org/10.30644/rik.v10i2.538

[18] Rosita, N. (2023). Analisis Kandungan Gula Pada Minuman Kekinian Thai Tea, MilkBobadan IceTea di UIN Jakarta. *Journal of Natural Sciences*, *4*(2), 71–78. https://doi.org/https://doi.org/10.34007/jonas.v4i2.392

[19] Saputri, M., Rahmawati, H., & Viatrie, D. (2021). Hubungan Dukungan Sosial Teman Sebaya dengan Intensi Perilaku Makan Sehat pada Mahasiswa Tahun Pertama Fakultas Mipa Universitas Negeri Malang. *Flourishing Journal*, *1*(5), 351–356. https://doi.org/10.17977/um070v1i52021p351-356

[20] Sędzikowska, A., & Szablewski, L. (2021). Human Glucose Transporters in Renal Glucose Homeostasis. *International Journal of Molecular Sciences*, *22*(24), 13522. https://doi.org/10.3390/ijms222413522

[21] SKI. (2023). *Survey Kesehatan Indonesia Dalam Angka*. Kementerian Kesehatan. Jakarta.

[22] Smith, G. I., Shankaran, M., Yoshino, M., Schweitzer, G. G., Chondronikola, M., Beals, J. W., Okunade, A. L., Patterson, B. W., Nyangau, E., Field, T., Sirlin, C. B., Talukdar, S., Hellerstein, M. K., & Klein, S. (2020). Insulin resistance drives hepatic de novo lipogenesis in nonalcoholic fatty liver disease. *Journal of Clinical Investigation*, *130*(3), 1453–1460. https://doi.org/10.1172/JCI134165

[23] Sun, J., Liu, Z., Zhang, Z., Zeng, Z., & Kang, W. (2022). The Correlation of Prediabetes and Type 2 Diabetes With Adiposity in Adults. *Frontiers in Nutrition*, *9*. https://doi.org/10.3389/fnut.2022.818263

[24] Syukri, M., Nomiko, D., & Sari, I. P. (2022). Kejadian Prediabetes pada Kelompok Usia Dewasa di Kota Jambi. *Jurnal Keperawatan Silampari*, *6*(1), 19–27. https://doi.org/10.31539/jks.v6i1.3846

[25] Tarmizi, M., & Siregar, F. A. (2024). Hubungan faktor metabolik dan konsumsi makanan minuman manis dengan kadar gula darah pada usia 30-60 tahun di Puskesmas Simalingkar. *Tropical Public Health Journal*, *4*(1), 27–34. https://doi.org/10.32734/trophico.v4i1.14534

[26] Vajravelu, M. E., Kindler, J. M., Zemel, B. S., Jawad, A., Koren, D., Brar, P., Brooks, L. J., Reiner, J., & Levitt Katz, L. E. (2022). Visceral adiposity is related to insulin sensitivity and inflammation in adolescents with obesity and mild sleep disordered breathing. *Journal of Pediatric Endocrinology and Metabolism*, *35*(8), 1069–1077. https://doi.org/10.1515/jpem-2021-0745

[27] Wagner, R., Heni, M., Kantartzis, K., Sandforth, A., Machann, J., Schick, F., Peter, A., Fritsche, L., Szendrödi, J., Pfeiffer, A. F. H., Schürmann, A., Blüher, M., Hauner, H., Seissler, J., Bornstein, S., Roden, M., Stefan, N., Birkenfeld, A. L., White, M. F., … Fritsche, A. (2023). Lower Hepatic Fat Is Associated With Improved Insulin Secretion in a High-Risk Prediabetes

Subphenotype During Lifestyle Intervention. *Diabetes*, *72*(3), 362–366. https://doi.org/10.2337/db22-0441

[28] Wang, L., & Zheng, S. (2020). Pancreatic senescence and its clinical manifestations. *Aging Medicine*, *3*(1), 51–55. https://doi.org/10.1002/agm2.12095