# 評価対象論文リスト(要因:歯の本数、アウトカム:循環器病)

評価判定日:2025/4/25

## ①既存の系統的レビュー・メタ解析・統合解析

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|---|---|
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| 2 | Humphrey LL, Fu R, Buckley DI, Freeman M, Helfand M. Periodontal disease and coronary heart disease incidence: a systematic review and meta-analysis. J GEN INTERN MED. 2008;23(12):2079-2086. doi:10.1007/s11606-008-0787-6 |
| 3 | Polzer I, Schwahn C, Völzke H, Mundt T, Biffar R. The association of tooth loss with all-cause and circulatory mortality. Is there a benefit of replaced teeth? A systematic review and meta-analysis. Clin Oral Invest. 2012;16(2):333-351. doi:10.1007/s00784-011-0625-9 |
| 4 | Lafon A, Pereira B, Dufour T, et al. Periodontal disease and stroke: a meta‐analysis of cohort studies. Euro J of Neurology. 2014;21(9):1155. doi:10.1111/ene.12415 |
| 5 | Dai R, Lam OLT, Lo ECM, Li LSW, Wen Y, McGrath C. A systematic review and meta-analysis of clinical, microbiological, and behavioural aspects of oral health among patients with stroke. Journal of Dentistry. 2015;43(2):171-180. doi:10.1016/j.jdent.2014.06.005 |
| 6 | Pillai RS, Iyer K, Spin-Neto R, Kothari SF, Nielsen JF, Kothari M. Oral health and brain injury: causal or casual relation? Cerebrovasc Dis Extra. 2018;8(1):1-15. doi:10.1159/000484989 |
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| 8 | Peng J, Song J, Han J, et al. The relationship between tooth loss and mortality from all causes, cardiovascular diseases, and coronary heart disease in the general population: systematic review and dose–response meta-analysis of prospective cohort studies. Bioscience Reports. 2019;39(1):BSR20181773. doi:10.1042/BSR20181773 |
| 9 | Fagundes NCF, Couto RSD, Brandão APT, et al. Association between tooth loss and stroke: a systematic review. Journal of Stroke and Cerebrovascular Diseases. 2020;29(8):104873. doi:10.1016/j.jstrokecerebrovasdis.2020.104873 |
| 10 | Gao S, Tian J, Li Y, et al. Periodontitis and number of teeth in the risk of coronary heart disease: an updated meta-analysis. Med Sci Monit. 2021;27. doi:10.12659/MSM.930112 |
| 11 | Aminoshariae A, Nosrat A, Jakovljevic A, Jaćimović J, Narasimhan S, Nagendrababu V. Tooth loss is a risk factor for cardiovascular disease mortality: a systematic review with meta-analyses. Journal of Endodontics. 2024;50(10):1370-1380. doi:10.1016/j.joen.2024.06.012 |
| 12 | Arbildo-Vega HI, Cruzado-Oliva FH, Coronel-Zubiate FT, et al. Periodontal disease and cardiovascular disease: umbrella review. BMC Oral Health. 2024;24(1):1308. doi:10.1186/s12903-024-04907-1 |
| 13 | Dibello V, Lobbezoo F, Panza F, et al. Oral frailty indicators and cardio- and cerebrovascular diseases in older age: A systematic review. Mechanisms of Ageing and Development. 2025;223:112010. doi:10.1016/j.mad.2024.112010 |

## ②日本人の個別疫学研究

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|---|---|
| 14 | Noguchi S, Toyokawa S, Miyoshi Y, Suyama Y, Inoue K, Kobayashi Y. Five-year follow-up study of the association between periodontal disease and myocardial infarction among Japanese male workers: MY Health Up Study. J Public Health. Published online October 7, 2014:fdu076. doi:10.1093/pubmed/fdu076 |
| 15 | Aoyama N, Suzuki J -I., Kobayashi N, et al. Associations among tooth loss, systemic inflammation and antibody titers to periodontal pathogens in Japanese patients with cardiovascular disease. J of Periodontal Research. 2018;53(1):117-122. doi:10.1111/jre.12494 |
| 16 | Ishikawa S, Konta T, Susa S, et al. Association between presence of 20 or more natural teeth and all-cause, cancer-related, and cardiovascular disease-related mortality: Yamagata (Takahata) prospective observational study. BMC Oral Health. 2020;20(1):353. doi:10.1186/s12903-020- |

■系統的レビューとメタ解析

| Reference | | | Include study | | | | | Design | | Relative risk (95% CI or p) | Weight | **Magnitude of association** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Author | Title | Year | Ref No. | First author | Year | Study period | Study location | Event (*Definition) | | | | | |
| Cheng F, Zhang M, Wang Q, Xu H, Dong X, Gao Z, Chen J, Wei Y, Qin F. | Tooth loss and risk of cardiovascular disease and stroke: A dose-response meta analysis of prospective cohort studies | 2018 | | Dietrich | 2008 | | USA | | | 1.90 (0.92, 3.93) | 1.61 | |
| | | | 23 | Dietrich | 2008 | | USA | CHD | | 1.71 (0.82, 3.55) | 1.59 | |
| | | | | Dietrich | 2008 | | USA | | | 1.95 (1.18, 3.22) | 2.59 | |
| | | | | Dietrich | 2008 | | USA | | | 2.04 (1.26, 3.33) | 2.69 | |
| | | | 8 | Howell | 2001 | | USA | CVD, Stroke | | 1.01 (0.82, 1.24) | 4.86 | |
| | | | 10 | Hung | 2004 | | USA | CHD | | 1.36 (1.11, 1.67) | 4.88 | |
| | | | | Hung | 2004 | | USA | CHD | | 1.64 (1.31, 2.05) | 4.71 | |
| | | | 24 | Elter | 2004 | | USA | CVD | | 3.30 (2.06, 5.27) | 4.68 | |
| | | | 18 | Tuominen | 2003 | | Finland | CHD | | 1.90 (1.20, 3.10) | 2.76 | |
| | | | | Tuominen | 2003 | | Finland | CHD | | 1.10 (0.30, 3.30) | 0.71 | |
| | | | 22 | Abnet | 2005 | | China | CVD, Stroke | | 1.28 (1.17, 1.40) | 5.68 | |
| | | | 21 | Holmlund | 2010 | | Sweden | CVD, CHD, Stroke | | 4.63 (2.95, 7.26) | 2.91 | |
| | | | | Holmlund | 2010 | | Sweden | CVD, CHD, Stroke | | 7.33 (4.11, 13.07) | 2.19 | |
| | | | 12 | Joshy | 2016 | | Australia | Ischaemic heart disease, Heart failure, Stroke | | 1.10 (0.95, 1.26) | 5.37 | |
| | | | | Joshy | 2016 | | Australia | | Cohort study | 1.97 (1.27, 3.07) | 2.97 | |
| | | | 9 | Hujoel | 2000 | | USA | CVD | | 0.88 (0.62, 1.25) | 3.24 | |
| | | | 11 | Joshipura | 1996 | | USA | CVD | | 1.29 (0.96, 1.73) | 4.11 | |
| | | | 13 | Jung | 2016 | | Korea | CVD | | 1.46 (1.36, 1.57) | 5.76 | |
| | | | 14 | Liljestrand | 2015 | | Finnish | CVD, CHD, Acutemyo cardial infarction, Stroke | | 1.41 (1.01, 1.95) | 3.12 | |
| | | | | Liljestrand | 2015 | | Finnish | | | 1.65 (1.09, 2.50) | 3.15 | |
| | | | | Liljestrand | 2015 | | Finnish | | | 1.84 (0.99, 3.42) | 2 | |
| | | | 15 | Noguchi | 2015 | | Japan | Myocardial infarction | | 1.97 (0.71, 5.45) | 0.94 | |
| | | | 16 | Schwahn | 2013 | | Caucasian | CVD | | 1.08 (0.68, 1.71) | 2.84 | |
| | | | 17 | Tuominen | 2007 | | United Kingdom | CHD | | 1.35 (0.73, 2.47) | 1.31 | |
| | | | | Tuominen | 2007 | | United Kingdom | | | 1.19 (0.84, 1.69) | 3.65 | |
| | | | 19 | Vedin | 2015 | | Sweden | CVD, Myocardial infarction, Stroke | | 1.30 (1.23, 1.37) | 5.83 | |
| | | | | Vedin | 2015 | | Sweden | | | 1.07 (1.02, 1.13) | 5.83 | |
| | | | 20 | Watt | 2012 | | Scotland | CVD, Stroke | | 1.22 (0.89, 1.68) | 3.91 | |
| | | | | | | | | | | 1.52 (1.37, 2.69) | | ↑ ↑ |
| | | | 14 | Liljestrand | 2015 | | Finnish | | | 1.17 (0.71, 1.92) | 1.37 | |
| | | | 8 | Howell | 2001 | | USA | | | 1.01 (0.81, 1.27) | 6.69 | |
| | | | 22 | Abnet | 2005 | | China | | | 1.11 (1.01, 1.23) | 34.84 | |
| | | | 21 | Holmlund | 2010 | | Sweden | Stroke | Cohort study | 2.01 (0.78, 5.16) | 0.38 | |
| | | | 12 | Joshy | 2016 | | Australia | | | 1.20 (0.90, 1.62) | 3.92 | |

Lowest tooth loss (ref) vs highest tooth loss

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 16 | Tu | 2007 | | United Kingdom | | | 1.64 (0.96, 2.80) | 1.18 | |
| | | | 19 | Vedin | 2015 | | Sweden | | | 1.22 (1.13, 1.33) | 50.95 | |
| | | | 20 | Watt | 2012 | | Scotland | | | 2.97 (1.46, 6.05) | 0.67 | |
| | | | | | | | | | Overall | 1.18 (1.11, 1.25) | | ↑ |
| Peng J, Song J, Han J, Chen Z, Yin X, Zhu J, Song J. | The relationship between tooth loss and mortality from all causes, cardiovascular diseases, and coronary heart disease in the general population: systematic review and dose-response meta-analysis of prospective cohort studies | 2019 | 27 | Vedin | 2015 | 3.7 years | 39 countries from five continents | Cardio vascular disease death | Cohort study | 1.18 (1.11, 1.25) | 16.4 | |
| | | | 25 | Tu | 2007 | 57 years | UK | | | 1.24 (1.03, 1.49) | 14.11 | |
| | | | 24 | Schwahn | 2013 | 9.9 years | German | | | 0.96 (0.84, 1.09) | 15.3 | |
| | | | 19 | Janket | 2014 | 15.8 years | Finland | | | 0.81 (0.65, 1.01) | 13.24 | |
| | | | 16 | Holmlund | 2010 | 12 years | Sweden | | | 1.79 (1.55, 2.06) | 15.06 | |
| | | | 11 | Ando | 2014 | 5.6 years | Japan | | | 1.07 (0.91, 1.26) | 14.53 | |
| | | | 12 | Cabrera | 2005 | 24 years | Sweden | | | 1.80 (1.34, 2.42) | 11.36 | |
| | | | | | | | | | Subtotal | 1.21 (1.01, 1.44) | 100 | ↑ |
| | | | 27 | Vedin | 2015 | 3.7 years | 39 countries from five continents | | | 1.40 (1.25, 1.57) | 16.33 | |
| | | | 25 | Tu | 2007 | 57 years | UK | | | 1.54 (1.07, 2.22) | 14.14 | |
| | | | 24 | Schwahn | 2013 | 9.9 years | German | | | 0.91 (0.71, 1.17) | 15.32 | |
| | | | 19 | Janket | 2014 | 15.8 years | Finland | | | 0.65 (0.42, 1.01) | 13.25 | |
| | | | 16 | Holmlund | 2010 | 12 years | Sweden | | | 3.19 (2.41, 4.22) | 15.06 | |
| | | | 11 | Ando | 2014 | 5.6 years | Japan | | | 1.15 (0.82, 1.61) | 14.45 | |
| | | | 12 | Cabrera | 2005 | 24 years | Sweden | | | 3.25 (1.81, 5.84) | 11.44 | |
| | | | | | | | | | | 1.45 (1.02, 2.07) | 100 | ↑ |
| | | | 27 | Vedin | 2015 | 3.7 years | 39 countries from five continents | | | 1.72 (1.43, 2.07) | 16.37 | |
| | | | 25 | Tu | 2007 | 57 years | UK | | | 2.00 (1.12, 3.58) | 14.15 | |
| | | | 24 | Schwahn | 2013 | 9.9 years | German | | | 0.87 (0.57, 1.32) | 15.28 | |
| | | | 19 | Janket | 2014 | 15.8 years | Finland | | | 0.50 (0.25, 1.01) | 13.24 | |
| | | | 16 | Holmlund | 2010 | 12 years | Sweden | | | 6.43 (4.10, 10.08) | 15.07 | |
| | | | 11 | Ando | 2014 | 5.6 years | Japan | | | 1.25 (0.73, 2.14) | 14.47 | |
| | | | 12 | Cabrera | 2005 | 24 years | Sweden | | | 6.59 (2.58, 16.84) | 11.42 | |
| | | | | | | | | | | 1.83 (1.04, 3.21) | 100 | ↑ ↑ |
| | | | 26 | Tuominen (male) | 2003 | 12 years | Finland | | | 0.94 (0.77, 1.15) | 14.76 | |
| | | | | Tuominen (female) | 2003 | 12 years | | | | 0.64 (0.42, 0.97) | 9.71 | |
| | | | 25 | Tu | 2007 | 57 years | UK | | | 1.18 (0.94, 1.49) | 14.13 | |
| | | | ? | Hung | 2014 | 12 years | ? | | | 1.22 (1.12, 1.33) | 17.15 | |
| | | | ? | Hung | 2014 | 12 years | ? | | | 1.17 (1.02, 1.35) | 16.22 | |
| | | | 16 | Holmlund | 2010 | 12 years | Sweden | | | 2.02 (1.67, 2.45) | 15.08 | |
| | | | 13 | Dietrich | 2008 | 24 years | USA | | | 1.56 (1.18, 2.06) | 12.96 | |
| | | | | | | | | | Subtotal | 1.21 (1.00, 1.47) | 100 | ↑ |
| | | | 26 | Tuominen (male) | 2003 | 12 years | Finland | Coronary heart disease death | | 0.89 (0.59, 1.34) | 14.93 | |
| | | | | Tuominen (female) | 2003 | 12 years | | | | 0.41 (0.18, 0.93) | 10.04 | |
| | | | 25 | Tu | 2007 | 57 years | UK | | | 1.40 (0.88, 2.22) | 14.31 | |
| | | | ? | Hung (male) | 2014 | 12 years | ? | | | 1.48 (1.23, 1.78) | 17.2 | |
| | | | ? | Hung (female) | 2014 | 12 years | ? | | | 1.38 (1.04, 1.83) | 16.37 | |
| | | | 16 | Holmlund | 2010 | 12 years | Sweden | | | 4.09 (2.80, 5.98) | 15.29 | |
| | | | 13 | Dietrich | 2008 | 24 years | USA | | | 2.43 (1.26, 4.69) | 11.86 | |
| | | | | | | | | | | 1.47 (0.99, 2.17) | 100 | – |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | 26 | Tuominen (male) | 2003 | 12 years | Finland | | | | 0.83 (0.43, 1.62) | 14.68 | |
| | | | | Tuominen (female) | 2003 | 12 years | | | | | 0.24 (0.06, 0.91) | 9.69 | |
| | | | 25 | Tu | 2007 | 57 years | UK | | | | 1.71 (0.82, 3.56) | 14.18 | |
| | | | ? | Hung (male) | 2014 | 12 years | ? | | Cohort study | Per 32 teeth loss | 1.87 (1.39, 2.51) | 17.04 | |
| | | | ? | Hung (female) | 2014 | 12 years | ? | | | | 1.67 (1.07, 2.61) | 16.22 | |
| | | | 16 | Holmlund | 2010 | 12 years | Sweden | | | | 9.53 (5.19, 17.49) | 15.14 | |
| | | | 13 | Dietrich | 2008 | 24 years | USA | | | | 4.15 (1.72, 10.01) | 13.04 | |
| | | | | | | | | | | | 1.87 (1.01, 3.47) | 100 | ↑ ↑ |
| Gao S, Tian J, Li Y, Liu T, Li R, Yang L, Xing Z. | Periodontitis and Number of Teeth in the Risk of Coronary Heart Disease: An Updated Meta-Analysis | 2021 | 28 | Joshipura et al | 1996 | 6 years | USA | Coronary heart disease incidence | Cohort study | 24–17 vs 32–25 | 1.03 (0.83, 1.27) | 8.39 | |
| | | | 30 | Hujoel et al | 2000 | 6 years | USA | | | | 0.84 (0.64, 1.09) | 5.36 | |
| | | | 33 | Hung et al | 2004 | 12 years | USA | | | | 1.10 (0.95, 1.26) | 19.04 | |
| | | | 33 | Hung et al | 2004 | 12 years | USA | | | | 1.14 (0.92, 1.42) | 8.06 | |
| | | | 33 | Hung et al | 2004 | 12 years | USA | | | | 1.26 (1.01, 1.57) | 7.8 | |
| | | | 33 | Hung et al | 2004 | 12 years | USA | | | | 1.02 (0.66, 1.55) | 2.08 | |
| | | | | | | | | | | Subtotal | 1.08 (0.99, 1.18) | 50.74 | |
| | | | 28 | Joshipura et al | 1996 | 6 years | USA | Coronary heart disease incidence | Cohort study | 16–11 vs 32–25 | 1.04 (0.71, 1.54) | 2.53 | |
| | | | 30 | Hujoel et al | 2000 | 6 years | USA | | | | 0.75 (0.51, 1.10) | 2.57 | |
| | | | 33 | Hung et al | 2004 | 12 years | USA | | | | 1.35 (1.06, 1.72) | 6.48 | |
| | | | 33 | Hung et al | 2004 | 12 years | USA | | | | 1.34 (0.97, 1.87) | 3.52 | |
| | | | 33 | Hung et al | 2004 | 12 years | USA | | | | 1.19 (0.79, 1.80) | 2.24 | |
| | | | 33 | Hung et al | 2004 | 12 years | USA | | | | 1.07 (0.56, 2.05) | 0.9 | |
| | | | | | | | | | | Subtotal | 1.16 (1.01, 1.35) | 18.25 | |
| | | | 28 | Joshipura et al | 1996 | 6 years | USA | Coronary heart disease incidence | Cohort study | 10–0 vs 32–25 | 1.29 (0.96, 1.73) | 4.38 | |
| | | | 30 | Hujoel et al | 2000 | 6 years | USA | | | | 0.88 (0.62, 1.25) | 3.09 | |
| | | | 33 | Hung et al | 2004 | 12 years | USA | | | | 1.36 (1.11, 1.61) | 9.1 | |
| | | | 33 | Hung et al | 2004 | 12 years | USA | | | | 1.64 (1.31, 2.05) | 7.57 | |
| | | | 33 | Hung et al | 2004 | 12 years | USA | | | | 1.79 (1.34, 2.40) | 4.47 | |
| | | | 33 | Hung et al | 2004 | 12 years | USA | | | | 1.65 (1.11, 2.46) | 2.4 | |
| | | | | | | | | | | Subtotal | 1.43 (1.28, 1.60) | 31.01 | |
| | | | | | | | | | | Overall | 1.20 (1.12, 1.27) | 100 | ↑ |
| Lafon A, Pereira B, Dufour T, Rigouby V, Giroud M, Béjot Y, Tubert-Jeannin S. | Periodontal disease and stroke: a meta-analysis of cohort studies | 2014 | 18 | Morrison | 1996 | | | Stroke[fatal] | Retrospective | | 1.63 (0.770–3.420) | 5.28 | |
| | | | 11 | Wu | | | | Stroke[fatal] | Prospective | Tooth loss: Subgroup Ischemic and haemorrhagic | 1.34 (0.760–2.370) | 14.31 | |
| | | | 14 | Tu | | | | Stroke[fatal] | Prospective | | 1.64 (0.960–2.800) | 10.96 | |
| | | | 17 | Holmlund | | | | Stroke[fatal] | Prospective | | 2.01 (0.780–5.160) | 1.93 | |
| | | | 15 | Heitmann (women) | | | | Stroke[fatal/non-f | Prospective | | 5.32 (1.980–14.300) | 0.24 | |
| | | | 15 | Heitmann (men) | | | | Stroke[fatal/non-f | Prospective | | 2.43 (0.950–6.280) | 1.31 | |
| | | | 11 | Wu (non-fatal) | 2000 | | | Non fatal | Prospective | | 1.23 (0.910–1.660) | 65.96 | |
| | | | 11 | Wu | 2000 | | | Fatal | Prospective | Tooth loss: Subgroup Ischemic and | 2.21 (1.14, 3.95) | 13.29 | |
| | | | 11 | Wu | 2000 | | | Non-fatal | Prospective | | 1.41 (0.96, 2.06) | 86.71 | |
| | | | | | | | | | | Pooled ES | 1.39 (1.13, 1.65) | | ↑ |

■コホート研究

| Reference | | | Study subjects | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Author | Title | Year | Study period | Number of subjects | Source of subjects | Event followed | Number of incident cases or deaths | Participant's race | Category | Number among cases | Relative risk (95%CI or p) | P for trend | Confounding variables considered | **Magnitude of association** |
| Noguchi S et al., | Five-year follow-up study of the association between periodontal disease and myocardial infarction among Japanese male workers: MY Health Up Study | 2015 | 2004-2008 | 3081 | Male workers;<br><br>MY Health Up Study; | Myocardial infarction incidence | 17 | Japanese | 20 or more teeth (ref)<br><br>Loss of five or more teeth | N/A;<br><br>N/A; | 1.00 (Reference)<br><br>1.97 (0.71–5.45) | | age, bmi, current smoking, hypertension, diabetes, dyslipidaemia | ↑ |
| Ishikawa S et al., | Association between presence of 20 or more natural teeth and all-cause, cancer-related, and cardiovascular disease-related mortality: Yamagata (Takahata) prospective observational study | 2020 | 2005-2016 | 2208 | Participants are 40 years old or older and live in Takahata Town, Yamagata Prefecture. | cardiovascular disease-related mortality | 55 | Japanese | Number of teeth ≥ 20<br>< 20 | 22<br>33 | 1.00 (Reference)<br>1.289 (95%CI=N/A) | 0.57 | age, sex, bmi, smoking habit, alcohol consumption, educationaal status, hypertension, diabetes mellitus, perceived mental stress | Unable to evaluation |