評価対象論文リスト（要因：歯の本数、アウトカム：がん）

評価判定日：2024/10/25

①既存の系統的レビュー・メタ解析・統合解析

1	Sadighi Shamami M, Sadighi Shamami M, Amini S. Periodontal disease and tooth loss as risks for cancer: a systematic review of the literature. Iran J Cancer Prev. 2011;4(4):189-198.
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3	Zeng XT, Luo W, Huang W, Wang Q, Guo Y, Leng WD. Tooth loss and head and neck cancer: a meta-analysis of observational studies. Ning Y, ed. PLoS ONE. 2013;8(11):e79074. doi:10.1371/journal.pone.0079074
4	Chen QL, Zeng XT, Luo ZX, Duan XL, Qin J, Leng WD. Tooth loss is associated with increased risk of esophageal cancer: evidence from a meta-analysis with dose-response analysis. Sci Rep. 2016;6(1):18900. doi:10.1038/srep18900
5	Yin XH, Wang YD, Luo H, et al. Association between tooth loss and gastric cancer: a meta-analysis of observational studies. Bencharit S, ed. PLoS ONE. 2016;11(3):e0149653. doi:10.1371/journal.pone.0149653
6	Ren HG, Luu HN, Cai H, et al. Oral health and risk of colorectal cancer: results from three cohort studies and a meta-analysis. Annals of Oncology. 2016;27(7):1329-1336. doi:10.1093/annonc/mdw172
7	Michaud DS, Fu Z, Shi J, Chung M. Periodontal disease, tooth loss, and cancer risk. Epidemiologic Reviews. 2017;39(1):49-58. doi:10.1093/epirev/mxx006
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11	Al-Maweri SA, Ibraheem WI, Al-Ak'hali MS, Shamala A, Halboub E, Alhajj MN. Association of periodontitis and tooth loss with liver cancer: A systematic review. Critical Reviews in Oncology/Hematology. 2021;159:103221. doi:10.1016/j.critrevonc.2021.103221
12	Xu S, Wang H lan, Xia C, Lv J, Zhang G. Associations between poor oral hygiene and risk of pancreatic cancer: a meta-analysis of observational studies. Pancreas. 2022;51(8):985-994. doi:10.1097/MPA.0000000000002143
13	Gonde N, Rathod S, Kolte A, Lathiya V, Ughade S. Association between tooth loss and risk of occurrence of oral cancer - A systematic review and meta-analysis. Dent Res J (Isfahan). 2023;20:4.
14	Mahuli AV, Sagar V, Kumar A, Mahuli SA, Kujur A. A systematic review and meta-analysis assessing the role of oral health as a risk factor in oral cancer. Cureus. Published online May 31, 2023. doi:10.7759/cureus.39786

②日本人集団の個別疫学研究

15	Watabe K, Nishi M, Miyake H, Hirata K. Lifestyle and gastric cancer: a case-control study. Oncol Rep. Published online September 1, 1998. doi:10.3892/or.5.5.1191
16	Hiraki A, Matsuo K, Suzuki T, Kawase T, Tajima K. Teeth loss and risk of cancer at 14 common sites in japanese. Cancer Epidemiology, Biomarkers & Prevention. 2008;17(5):1222-1227. doi:10.1158/1055-9965.EPI-07-2761
17	Ansai T, Takata Y, Yoshida A, et al. Association between tooth loss and orodigestive cancer mortality in an 80-year-old community-dwelling Japanese population: a 12-year prospective study. BMC Public Health. 2013;13(1):814. doi:10.1186/1471-2458-13-814

18	Ando A, Tanno K, Ohsawa M, et al. Associations of number of teeth with risks for all-cause mortality and cause-specific mortality in middle-aged and elderly men in the northern part of J apan: the I wate- KENCO study. Comm Dent Oral Epid. 2014;42(4):358-365. doi:10.1111/cdoe.12095
19	Goto Y, Wada K, Uji T, et al. Number of teeth and all-cause and cancer mortality in a japanese community: the takayama study. Journal of Epidemiology. 2020;30(5):213-218. doi:10.2188/jea.JE20180243
20	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/s12903-020-01346-6
21	Tsukamoto M, Naito M, Wakai K, et al. Tooth brushing, tooth loss, and risk of upper aerodigestive tract cancer: a cohort study of Japanese dentisits. Published online May 2021. doi:10.18999/nagjms.83.2.331

■系統的レビュー・メタ解析

Reference			Include study					Design	Category	Relative risk (95% CI or p)	Weight	**Magnitude of association**
Author	Title	Year	Ref No.	First author	Year	Study period	Study location	Event					
Gonde N, Rathod S, Kolte A, Lathiya V, Ughade S.	Association between tooth loss and risk of occurrence of oral cancer - A systematic review and meta-analysis	2023	17	Zheng	1990	1 years	China	Oral cancer incidence	Case-control study	More than 15 teeth lost	1.826 (1.130-2.952)	15.46	
			18	Bundgaard	1995	4 years	Denmark				2.281 (1.587-3.278)	27.11	
			19	Garrote	2001	3 years	Cuba				2.680 (1.760-4.081)	20.16	
			21	Lissowska	2003	3 years	Poland				2.448 (1.437-4.170)	12.56	
			22	Rosenquist	2005	4 years	Southern Sweden				3.647 (1.999-6.654)	9.85	
			25	Chang	2013	2 years	Taiwan				2.496 (2.067-3.015)	14.86	
											2.501 (2.071-3.020)	100	↑ ↑ ↑
Zeng XT, Luo W, Huang W, Wang Q, Guo Y, Leng WD.	Tooth loss and head and neck cancer: a meta-analysis of observational studies	2013	10	Zheng	1990		China	Head and neck cancer incidence	Case-control study	15+ teeth loss	5.98 (3.10, 11.55)		
			22	Bundgaard	1995		Denmark				2.11 (1.40, 3.18)		
			23	Talamini	2000		Italy				1.40 (0.62, 3.18)		
			2001	Garrote	2001		Cuba				2.74 (1.32, 5.69)		
			25	Lissowska	2003		Poland				9.80 (2.25, 42.67)		
			26	Rosenquist	2005		Sweden				1.60 (0.39, 6.58)		
			27	Guha E	2007		Central Europe				0.70 (0.44, 1.11)		
			27	Guha LA	2007		Latin America				1.31 (1.00, 1.72)		
			29	Hiraki	2008		Japanese				1.40 (1.00, 1.97)		
			13	Michaud	2008		USA				1.60 (0.84, 3.04)		
			28	Divaris	2010		USA				1.21 (0.94, 1.56)		
										Fixed effects model	1.45 (1.27, 1.65)		
										Random effects model	1.72 (1.26, 2.36)		↑ ↑

■系統的レビュー

Reference			Excepts of result in the paper
Author	Title	Year	
Michaud DS, Fu Z, Shi J, Chung M.	Periodontal Disease, Tooth Loss, and Cancer Risk	2017	Lung cancer: Two out of 4 cohort studies observed a statistically significant higher risk of lung cancer with a higher number of missing teeth after adjustment for smoking dose (11, 32–34). One large case-control study also reported a positive association with teeth number and lung cancer risk (35).
			Head ancd neck cancer: Seven case-control studies were included for dose-response meta-regression analyses for oral cancer. The linear dose-response meta-regression for teeth number and oral cancer risk was statistically significant; a 0.03 (95% CI: 0.01, 0.05) increase in the odds ratio was observed for each additional tooth lost (Figure 3), with moderate heterogeneity (I2 = 67.5%, P = 0.003). In dose-response meta-regression analyses of 6 case-control studies, no significant linear or nonlinear dose-response relationship between teeth number and head and neck cancer risk was observed (data not shown) (35, 41–44).
			Pancreatic cancer: Associations between missing teeth and pancreatic cancer risk have not been consistent (Web Figure 2B).
			Stomach and esophageal cancers: Three cohort and 4 case-control studies examined the associations between teeth number and risk of esophageal cancer, but no dose-response trends were observed in either cohort or case-control studies (Web Figures 2C and 5B, respectively).
			Breast cancer: Findings from 5 cohort studies with data on number of teeth and risk of colorectal cancer have been consistently null (11, 16, 32, 33).

■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**
Ansai T et al	Association between tooth loss and orodigestive cancer mortality in an 80-year-old community-dwelling Japanese population: a 12-year prospective study	2013	1998-2010	656	Fukuoka 8020 survey (Cohort study); The subjects were 80 years old at baseline.	Orodigestive cancer death;	Total death; 414 Cancer death; 71 Orodigestive cancer death; 37	Japanese	Orodigestive cancer death; Number of missing teeth as continuous covariate	37	1.06 (1.01–1.13)	0.015	Sex, smoking status, total cholesterol, serum albumin, fasting serum glucose, bmi, physical activity, place of residence	↑
Ando A et al	Associations of number of teeth with risks for all-cause mortality and cause-specific mortality in middle-aged and elderly men in the northern part of Japan: the Iwate-KENCO study	2014	2002-2009	8476	Iwate-KENCO study	Cancer death;	Total death; 455 Cancer death; 175	Japanese	Cancer death; Tooth number; 0 1-9 10-19 ≥20	65 45 27 38	1.33 (0.86–2.05) 1.17 (0.74–1.82) 0.90 (0.55–1.48) Reference	0.124	Age, BMI, SBP, TC, HDLC, HbA1c, Smoking status, drinking status, education level	-
Goto Y, Wada K, Uji T, Koda S, Mizuta F, Yamakawa M, Nagata C.	Number of Teeth and All-Cause and Cancer Mortality in a Japanese Community: The Takayama Study	2020	1992-2002	11273	Takayama Study	Cancer death;	Total death; 1098 Total cancer death; 435 Lung cancer; 113 Upper gastrointestinal cancer; 78 Orodigestive 209	Japanese	Number of teeth; ≥20 10-19 0-9 Lung cancer death; ≥20 10-19 0-9 Upper gastrointestinal cancer; ≥20 10-19 0-9 Orodigestive cancer; ≥20 10-19 0-9	Total cancer death; 155 105 175 32 27 54 31 25 22 78 54 77	1.00 (Reference) 1.18 (0.92–1.53) 1.31 (1.03–1.67) 1.00 (Reference) 1.39 (0.82–2.34) 1.75 (1.08–2.83) 1.00 (Reference) 1.50 (0.87–2.60) 0.88 (0.48–1.61) 1.00 (Reference) 1.22 (0.85–1.74) 1.16 (0.82–1.65)	0.02 0.03 0.7 0.33	age, sex, body mass index, pack-years of smoking, alcohol consumption, education level, marital status, physical exercise, and medical history of hypertension and diabetes mellitus	↑ ↑ ↑ - -
Ishikawa S, Konta	Association between presence of 20 or more natural teeth and all-cause, cancer-related, and cardiovascular disease-related mortality:	2020	2005-2016	2208	A prospective	Cancer death;	Total death;	Japanese					age, sex, bmi, smoking habit,	

I, Susa S, Ishizawa K, Togashi H, Ueno Y, Yamashita H, Kayama T, Iino M.	Yamagata (Takahata) prospective observational study				observational study including 2208 participants aged ≥ 40 years was conducted in Takahata Town, Japan		219 Cancer death; 82 CVD death; 55		After adjusting for covariates, the risk of all-cause mortality was significantly higher in the group with < 20 teeth than in those with >= 20 teeth (HR = 1.604, 95% CI 1.007-2.555, p = 0.047). However, the risk of cancer- and cardiovascular disease-related mortalities was not statistically significant between the two groups.				alcohol consumption, educational status, hypertension, diabetes mellitus, perceived mental stress	
Tsukamoto M, Naito M, Wakai K, Naito T, Kojima M, Umemura O, Yokota M, Hanada N, Kawamura T.	Tooth brushing, tooth loss, and risk of upper aerodigestive tract cancer: a cohort study of Japanese dentisits	2021	2001-2014	20,445 dentists	Multi-phasic, Odontological, and Nutritional Associations in Dentists (LEMONADE) cohort study	Upper aerodigestive tract cancer incidence (include lip, base of tongue, gum, floor of mouth, palate, other and unspecified parts of mouth, oropharynx, hypopharynx, and	Oral cancer; 11 Pharyngeal cancer; 10 Esophageal cancer; 41	Japanese	Number of teeth lost; 0-14 15-27 28 0-9 10-19 20-28	digestive tract cancer; 50 6 6 47 6 9	1.00 (Reference) 1.03 (0.41–2.61) 1.37 (0.50–3.75) 1.00 (Reference) 1.14 (0.45–2.87) 1.10 (0.46–2.62)	0.58 0.81	sex, age, alcohol consumption, smoking, brushing frequency	- -

■症例対照研究

Reference			Study subjects					Category	Number among cases	Relative risk (95%CI or p)	P for trend	Confounding variables considered	**Magnitude of association**
Author	Title	Year	Study period	Type and source	Definition	Number of cases	Number of controls						
Hiraki A, Matsuo K, Suzuki T, Kawase T, Tajima K.	Teeth loss and risk of cancer at 14 common sites in Japanese	2008	2001-2005	Hospital-based Epidemiologic Research Program at Aichi Cancer Center	Case; Any of 14 types of incident cancer newly diagnosed Control; Noncancer outpatients	Total; 5240 Head and neck 429 Esophagus 354 Stomach 702 Colon 662 Liver 167 Pancreas 178 Lung 909 Breast 756 Uterus 429 Ovary 103 Prostate 136 Bladder 62 Thyroid 121 Lymphoma 232	10480	No. remaining teeth	Head and neck;			age, sex, smoking status, drinking status, vegetable and fruit intake, BMI, and regular exercise	
								21	197	1.00 (Reference)			
								9-20	122	1.17 (0.88-1.59)	0.055		
								1-8	78	1.31 (0.88-1.93)			
								0	32	1.68 (0.88-1.93)			↑
									Esophagus;				
								21	140	1.00 (Reference)			
								9-20	106	1.03 (0.72-1.48)	0.002		
								1-8	78	1.93 (1.24-3.01)			
								0	30	2.36 (1.17-4.75)			↑ ↑ ↑
									Stomach;				
								21	356	1.00 (Reference)			
								9-20	209	1.08 (0.87-1.35)	0.707		
								1-8	103	1.14 (0.85-1.52)			
								0	34	0.90 (0.58-1.41)			-
									Colon;				
								21	315	1.00 (Reference)			
								9-20	220	1.22 (0.97-1.52)	0.579		
								1-8	98	1.11 (0.82-1.50)			
								0	29	0.92 (0.56-1.51)			-
									Liver;				
								21	68	1.00 (Reference)			
								9-20	57	1.74 (1.04-2.89)	0.113		
								1-8	34	1.64 (0.90-2.98)			
								0	8	1.35 (0.51-3.58)			-
									Pancreas;				
								21	84	1.00 (Reference)			
								9-20	60	1.33 (0.86-2.07)	0.873		
								1-8	20	0.60 (0.32-1.14)			
								0	14	1.33 (0.57-3.10)			-
									Lung;				
								21	395	1.00 (Reference)			
								9-20	279	1.02 (0.83-1.24)	0.027		
								1-8	165	1.22 (0.94-1.57)			
								0	70	1.54 (1.05-2.27)			↑ ↑
									Breast;				
								21	490	1.00 (Reference)			
								9-20	183	0.89 (0.72-1.11)	0.387		
								1-8	72	0.95 (0.68-1.33)			
								0	11	0.79 (0.37-1.63)			-
									Uterus;				
								21	276	1.00 (Reference)			
								9-20	105	1.12 (0.81-1.54)	0.393		
								1-8	36	0.71 (0.45-1.13)			
								0	12	0.90 (0.43-1.88)			-
									Ovary;				
								21	64	1.00 (Reference)			
								9-20	26	0.95 (0.51-1.76)	0.311		
								1-8	12	0.92 (0.40-2.09)			
								0	1	0.18 (0.02-1.55)			↓ ↓

		Prostate;			
	21	71	1.00 (Reference)		
	9-20	39	0.86 (0.51-1.47)	0.049	
	1-8	19	0.57 (0.29-1.12)		
	0	7	0.49 (0.19-1.26)		↓ ↓
		Bladder;			
	21	30	1.00 (Reference)		
	9-20	15	0.80 (0.37-1.76)	0.402	
	1-8	12	1.16 (0.46-2.91)		
	0	5	2.85 (0.57-14.22)		↑ ↑
		Thyroid;			
	21	65	1.00 (Reference)		
	9-20	29	1.05 (0.59-1.84)	0.127	
	1-8	21	2.15 (1.05-4.40)		
	0	6	1.27 (0.38-4.25)		-
		Lymphoma			
	21	124	1.00 (Reference)		
	9-20	73	1.44 (0.94-2.21)	0.203	
	1-8	28	1.34 (0.76-2.35)		
	0	7	1.17 (0.40-3.44)		-