Supplementary Table S2. Characteristics of included studies

Author, year, country	Study design	Population			Periodontal assessment[a]		Physical fitness		OCEBM (2011) levels of evidence[b]
		Sample size, gender	Mean age	Confounding factors	Diagnosis criteria	Periodontal diagnosis	Parameter	Method	
Shimazaki et al. (2010)[32] Japan	Cross-sectional study (retrospective data)	1160	20 to 77 years	Age, gender, number of teeth, smoking status, fasting plasma glucose, systolic blood pressure	Partial-mouth recording protocol Two groups based on the number of sextants with CPI code 3 or 4 No or mild periodontitis: 0 to 2 sextants (n = 936; 80.7%) Severe periodontitis: ≥3 sextants (n = 224; 19.3%)	No or slight periodontitis, and severe periodontitis	Maximum amount of oxygen the body can utilize during exercise – VO_{2max}	Heart rate measurement at 3 different submaximal workloads, using an electric-bicycle ergometer	3
Eberhard et al. (2014)[33] Germany	Cross-sectional study	72 healthy men	45 to 65 years Mean age: 52.7 ± 5.4 years	Age, BMI, physical activity	Full-mouth recording protocol Moderate periodontitis: ≥2 interproximal sides with CAL ≥4 mm, or by ≥2 interproximal sides with PD ≥5 mm (not at the same tooth) Severe periodontitis: ≥2 interproximal sides with CAL ≥6 mm and ≥1 interproximal side with PD ≥5 mm (not at the same tooth) No or mild periodontitis was specified if neither moderate nor severe periodontitis was diagnosed	No or mild periodontitis, moderate periodontitis, and severe periodontitis	Maximum oxygen consumption was defined as the maximum mean value over a period of 30 seconds during the test – VO_{2peak}	Cardiorespiratory fitness was measured directly from respiratory gas exchange during a standardized cardiopulmonary stepwise exercise testing on a cycle ergometer (Ergoline, Bitz, Germany). All tests were stopped with the onset of dyspnea and/or peripheral muscle fatigue. The resulting VO_{2peak} value in mL O_2 per kg body weight per minute allowed a direct comparison of individuals regardless of body weight.	3

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Author, year, country	Study design	Population			Periodontal assessment[a]		Physical fitness		OCEBM (2011) levels of evidence[b]
		Sample size, gender	Mean age	Confounding factors	Diagnosis criteria	Periodontal diagnosis	Parameter	Method	
Thai et al. (2014)[34] USA	Cross-sectional study (retrospective data)	2856 (NHANES 1999–2004)	20 to 49 years	Age, gender, education level, race/ethnicity, smoking status, hypertension, pulse, BMI, MET minutes per week ({[(number of times engaged in the activity in past 30 days x average duration of activity x MET score for activity)/30 days] x 7 days}), physical activity, diabetes (HbA1c ≥ 6.5% or self-report of physician diagnosed diabetes), cholesterol, CRP, and wight blood cell count	Partial-mouth recording protocol Moderate periodontitis: ≥2 interproximal sides with CAL ≥4 mm, or by ≥2 interproximal sides with PD ≥5 mm (not at the same tooth) Severe periodontitis: ≥2 interproximal sides with CAL ≥6 mm and ≥1 interproximal side with PD ≥5 mm (not at the same tooth) No or mild periodontitis was specified if neither moderate nor severe periodontitis was diagnosed	No or mild periodontitis, moderate periodontitis, and severe periodontitis	Estimated maximum amount of oxygen the body can utilize during exercise –eVO_{2max}	Cardiorespiratory fitness assessment: 2-minute warm-up, two 3-minute exercise stages, and a 2-minute cool down with the goal of reaching approximately 75% of the age predicted maximum heart rate by the end of the test. Heart rate was monitored continuously, and blood pressure was measured at the end of each stage. eVO_{2max} was determined based on heart rate measured during the two 3-minute exercise states.	3

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Author, year, country	Study design	Population			Periodontal assessment[a]		Physical fitness		OCEBM (2011) levels of evidence[b]
		Sample size, gender	Mean age	Confounding factors	Diagnosis criteria	Periodontal diagnosis	Parameter	Method	
Oliveira et al. (2015)35 Brazil	Cross-sectional study	111 male military police officers	≥20 years	Age, BMI, physical activity	Full-mouth recording protocol Participants were categorized according to the number of teeth with PD ≥5 mm and AL ≥4 mm (no teeth and ≥1 tooth) BOP categories (median value [15% of sites]) Moderate periodontitis (≥2 interproximal sites with CAL ≥4 mm and ≥1 interproximal site with PD ≥5 mm in nonadjacent teeth)	Moderate periodontitis	Physical fitness test (PFT score range: 0–300)	Four physical fitness exercises: 1) Push-up exercises begin with the participant lying on his stomach on the floor. With his palms flat on the floor and using his arms as leverage, the participant pushes his body up and lowers his body down to the floor. The maximum number of repetitions is recorded; 2) Pull-up exercises are conducted with the body suspended by the hands from a bar. Using his arms, the participant lifts and lowers his body until his chin is level with the bar. The maximum number of repetitions is recorded; 3) Sit-up exercises begin with the person lying with his back on the floor. The participant lifts his upper and lower vertebrae from the floor until his upper body (above the buttocks) does not touch the ground. The maximum number of repetitions in 1 minute is recorded; 4) The participant is asked to run for 12 minutes on an athletics track. This fitness test is similar to those performed in national armies and police departments from other countries Individuals were classified according to whether the highest PFT score (300) was "achieved" (better physical fitness) or "not achieved"	3

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Author, year, country	Study design	Population			Periodontal assessment[a]		Physical fitness		OCEBM (2011) levels of evidence[b]
		Sample size, gender	Mean age	Confounding factors	Diagnosis criteria	Periodontal diagnosis	Parameter	Method	
Eremenko et al. (2016)[36] Germany	Cross-sectional study (retrospective data)	2089 (SHIP-2) 982 male and 1107 female	Male: 56.7 ± 13.3 years Female: 55.0 ± 13.0 years	Age, mean CAL, interaction CAL x age (50–69), interaction CAL x age (≥70), BMI, WHR, HbA1c, and hsCRP	Full-mouth recording protocol PD and CAL were assessed at 4 sites per tooth (midbuccal, mesiobuccal, distobuccal, and midlingual/palatal)	NA	Handgrip strength	Measured by handheld Smedley type dynamometer used for diagnostic purposes (Scandidact, Denmark) Strength was also expressed as handgrip strength in relation to BMI (GSBMI) Handgrip strength measured grip strength left- and right-handed – maximum strength of either hand was used as dependent variable	2
Hoppe et al. (2017)[37] Brazil	Cross-sectional study	112 male military police officers	≥20 years	Age, BMI, physical activity Radiographic assessment of AP and RCT variables. EB was calculated as the sum of the total number of teeth with AP and/or RCT for each individual. EB was categorized as zero, 1–2 or ≥3 teeth. The OIB was calculated combining EB and AL and was defined according to 4 categories: EB <3 and no CAL ≥4 mm; EB ≥3 and no CAL ≥4 mm; EB <3 and CAL ≥4 mm; and EB ≥3 and CAL ≥4 mm	Partial-mouth recording protocol Three sites per tooth (midbuccal, mesiobuccal, and distolingual/palatal), including PD, CAL, BOP	NA	Physical fitness test (PFT score range: 0–300)	Combination of physical strength and cardiorespiratory fitness	3

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Author, year, country	Study design	Population			Periodontal assessment[a]		Physical fitness		OCEBM (2011) levels of evidence[b]
		Sample size, gender	Mean age	Confounding factors	Diagnosis criteria	Periodontal diagnosis	Parameter	Method	
Holtfreter et al. (2021)[21] Germany	Two independent cross-sectional studies of the SHIP-1 (retrospective data)	1639 SHIP-1 participants, and 2439 SHIP-Trend-0 participants	≥4 years	Age, gender, equivalent income, smoking status, alcohol consumption, physical activity, self-reported general health, BMI, type 2 diabetes mellitus, and time between basic and spiroergometry examinations	Partial-mouth recording protocol Mean PD and CAL	NA	Cardiopulmonary exercise testing – CPET	Measured using a calibrated electromagnetically braked cycle ergometer. The following parameters were assessed: peak oxygen uptake (VO_{2peak}), oxygen uptake at anaerobic threshold (VO_2@AT), the minute ventilation changes as a function of the pulmonary carbon dioxide output ($V\dot{E}/VCO_2$ slope), peak oxygen pulse (O_2HR_{max}), and exercise duration	2

[a]All permanent teeth were assessed, excluding the third molars.
[b]OCEBM Levels of Evidence Working Group. "The Oxford Levels of Evidence 2". Oxford Centre for Evidence-Based Medicine. Available from: cebm.ox.ac.uk/resources/levels-of-evidence/ocebm-levels-of-evidence.
AP = apical periodontitis; BF = percentage body fat; BMI = body mass index; BOP = bleeding on probing; CAL = clinical attachment loss; CPET = cardiopulmonary exercise testing; CRP = C-reactive protein; EB = endodontic burden; eVO_{2max} = estimated maximum amount of oxygen consumption during exercise; HbA1c = glycated haemoglobin A1c; hsCRP = high-sensitive C-reactive protein; MET = metabolic equivalent; NHANES = National Health and Nutrition Examination Survey; O_2HR_{max} = peak oxygen pulse; OIB = oral inflammatory burden; PD = probing depth; RCT = root canal treatment; SD = standard deviation; SHIP-1 = 5-y follow-up (2002–2006) of the Study of Health in Pomerania; SHIP-Trend-0 = second Study of Health in Pomerania; SHIP-2 = 10-y follow-up (launched in 2008) of the Study of Health in Pomerania; $V\dot{E}/VCO_2$ slope = slope of the minute ventilation changes as a function of the pulmonary carbon dioxide output; VO_{2max} = maximum oxygen consumption during exercise; VO_{2peak} = maximum oxygen consumption over a 30-second period during the test; VO_2@AT = oxygen uptake at anaerobic threshold; WHO = World Health Organization; WHR = waist-to-hip ratio; WHtR = waist-to-height ratio; β = regression coefficient; 95% CI = confidence interval; NA = not applicable

CITATION

Da Silva Barbirato D, Gomes de Matos BLD, Guimarães TC, Medeiros de Barros MC. The impact of periodontitis on physical fitness: a systematic review. *Can J Dent Hyg.* 2026;60(2):132–40.