Supplementary material

Supplementary Table 1. Characteristics of Included Studies.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| S.No | Study ID | n | Age Range(years) | Country | Site | Devices | Overall Bite force | Male | Female | Right Side | Left Side | Unit |
| Meansd | n | Meansd | n | Meansd | n | Meansd | n | Meansd |
| Primary Dentition |
| 1 | Kamegai *et al*. 2005 | 72 | 3–5 | Japan | Pri 2nd molar | Portable OBF gauge/Meter | 19696.1 | 36 | 186.296.3 | 37 | 203.497.0 |  |  |  |  | N |
| 2 | Ohira *et al*. 2011 | 98 | 4–6 | Japan | Pri2nd molar | Portable OBF gauge/Meter |  | 50 | 20846.2 | 48 | 20136.1 |  |  |  |  | N |
| 3 | Hama *et al*. 2017 | 128 | 4–5 | Japan | Pri molars | Portable OBF gauge/Meter | 185.1189.23 |  |  |  |  |  |  |  |  | N |
| 4 | Hama *et al*. 2017 | 134 | 5–6 | Japan | Pri molars | Portable OBF gauge/Meter | 234. 1499.66 |  |  |  |  |  |  |  |  | N |
| 5 | Abu-Alhaija *et al*. 2018 | 1085 | 3–6 | Jordan | Pri2nd molar | Portable OBF gauge/Meter | 197.4265.74 | 515 | 207.867.66 | 570 | 188.3162.68 | 1085 | 203.1268.57 | 1085 | 191.7267.75 | N |
| 6 | Owais *et al*. 2018 | 22 | 4–6 | Jordan | Pri 2nd molar | Portable OBF gauge/Meter |  |  |  |  |  | 22 | 146.02Nil | 22 | 150.00Nil | N |
| 7 | Maria Beatriz *et al*. 2007 | 15 | 3–6 | Brazil | Pri molars | Pressurized rubber tube | 235.1244.48 |  |  |  |  |  |  |  |  | N |
| 8 | Rentes *et al*. 2002 | 30 | 3–6 | Brazil | Pri molars | PressurizedTransducer | 234.6642.98 |  |  |  |  |  |  |  |  | N |
| 9 | Castelo *et al*. 2010 | 14 | 4–6 | Brazil | Pri molars | PressurizedTransducer | 28750.63 |  |  |  |  |  |  |  |  | N |
| 10 | Castelo *et al*. 2010 | 19 | 4–6 | Brazil | Pri molars | PressurizedTransducer | 280.4648.31 |  |  |  |  |  |  |  |  | N |
| 11 | Karibe *et al*. 2003 | 20 | 3–6 | Japan | Pri1st and 2nd molar | Dental Pre Scale |  |  |  |  |  | 20 | 48.435.8 | 20 | 4636 | N |
| 12 | Oueis 2009 | 24 | 4–6 | Tokyo | CO | Dental Pre Scale | 385.1148.2 |  |  |  |  |  |  |  |  | N |
| 13 | Sato *et al*. 2011 | 45 | 5–6 | Japan | Data not available | Dental Pre Scale | 278122 |  |  |  |  |  |  |  |  | N |
| 14 | Mountain *et al*. 2011 | 199 | 3–6 | UK | Pri1st and 2nd molar | Single tooth bite force gauge | 196.669.77 | 120 | 188.7866.73 | 85 | 166.8377.83 | 199 | 179.7472.15 | 199 | 175.0766.9 | N |
| 15 | Heydari *et al*. 2018 | 49 | 3–6 | Tehran | Pri1st and 2nd molar | Flexiforce Sensor | 337.9102.73 | 30 | 353.188.53 | 19 | 293.18103.19 | 49 | 338.43105.84 | 49 | 321.3190.72 | N |
| 16 | Su *et al*. 2009 | 201 | 4–6 | Kaohsiung, Taiwan | Pri molars | Bite force MPM 3000 | 5.694.19 |  |  |  |  | 201 | 4.474.11 | 201 | 4.163.63 | Kgs |
| Mixed Dentition |
| 1 | Fields *et al*. 1986 | 17 | 6–12 | Michigan | Perm 1st molar | Pressurized transducer | 15.210.38 |  |  |  |  |  |  |  |  | Kgs |
| 2 | Maki *et al*. 2001 | 61 | 7 | Japan | Perm1st molar | Pressurized transducer |  |  | 22.24.2 |  | 21.93.1 |  |  |  |  | Kgs |
| 3 | Maki *et al*. 2001 | 72 | 8 | Japan | Perm1st molar | Pressurized transducer |  |  | 22.73.3 |  | 22.32.7 |  |  |  |  | Kgs |
| 4 | Maki *et al*. 2001 | 75 | 9 | Japan | Perm1st molar | Pressurized transducer |  |  | 29.43.7 |  | 274.4 |  |  |  |  | Kgs |
| 5 | Sonnesen *et al*. 2001 | 26 | 7–13 | Denmark | Perm 1st mand molar | Pressurized rubber tube | 382.263.9 |  |  |  |  | 26 | 386.262.9 | 26 | 378.370.6 | N |
| 6 | Sonnesen *et al*. 2005 | 88 | 7–13 | Denmark | Perm 1st mand molar | Pressurized rubber tube | 362.272.7 | 40 | 370.464.8 |  |  | 48 | 355.378.7 |  |  | N |
| 7 | Gaviao *et al*. 2006 | 15 | 7–10 | Brazil | Perm 1st molar | Pressurized rubber tube | 441.6344.3 |  |  |  |  |  |  |  |  | N |
| 8 | Sonnesen *et al*. 2007 | 19 | 7–11 | Denmark | Perm 1st mand molar | Pressurized rubber tube | 293.1867.33 |  |  |  |  |  |  |  |  | N |
| 9 | Castelo *et al*. 2010 | 13 | 5–7 | Brazil | Pri molars | Pressurized rubber tube | 352.8123.67 |  |  |  |  |  |  |  |  | N |
| 10 | Castelo *et al*. 2010 | 14 | 5–7 | Brazil | Pri molars | Pressurized rubber tube | 333.0244.18 |  |  |  |  |  |  |  |  | N |
| 11 | Lemos *et al*. 2006 | 36 | 7–12 | Brazil | Perm molars | Pressurized rubber tube | 410.0752.32 | 19 | 418.0465.79 | 17 | 401.1630.96 |  |  |  |  | N |
| 12 | Serra *et al*. 2007 | 22 | 6–9 | Brazil | Perm 1st molar | Pressurized rubber tube | 30261 | 10 | 29558 | 10 | 30966 |  |  |  |  | N |
| 13 | Kamegai *et al*. 2005 | 486 | 6–8 | Japan | Perm 1st molar | Portable OBF gauge/meter | 296.3128.1 | 226 | 313136.3 | 260 | 281.7119 |  |  |  |  | N |
| 14 | Kamegai *et al*. 2005 | 533 | 9–11 | Japan | Perm 1st molar | Portable OBF gauge/meter | 393.3138.5 | 276 | 416.1133.3 | 257 | 369.5140.2 |  |  |  |  | N |
| 15 | Usui *et al*. 2007 | 70 | 7–9 | Japan | Perm 1st max molar | Portable OBF gauge/meter |  | 30 | 26.29.1 | 40 | 20.910.9 |  |  |  |  | KgF |
| 16 | Usui *et al*. 2007 | 70 | 10–11 | Japan | Perm 1st max molar | Portable OBF gauge/meter |  | 30 | 35.113.2 | 40 | 26.213.0 |  |  |  |  | KgF |
| 17 | Haritha *et al*. 2012 | 40 | 8–12 | India | Perm 1st molar | Portable OBF gauge/meter | 191.1711.47 | 20 | 183.0728.81 | 20 | 199.2733.93 |  |  |  |  | N |
| 18 | Antonarakis *et al*. 2015 | 20 | 9–13 | Geneva | Perm 1st molar | Portable OBF gauge/meter | 422.8107.1 |  |  |  |  |  |  |  |  | N |
| 19 | Al-Khateeb *et al*. 2015 | 33 | 10–13 | Jordan | Perm 1st molar | Portable OBF gauge/meter | 325.595.2 | 17 | 352.199.1 | 16 | 274.764 |  |  |  |  | N |
| 20 | Subramaniam *et al*. 2016 | 24 | 6–9 | India | Pri molars | Portable OBF gauge/meter |  |  |  |  |  | 8 | 104.637.1 | 8 | 80.738.6 | N |
| 21 | Medhat *et al*. 2018 | 177 | 8–9 | Iraq | Perm 1st molar | Portable OBF gauge/meter |  | 80 | 106.434.6 | 97 | 104.331 | 80 | 12961.4 | 80 | 110.549.6 | N |
| 22 | Medhat *et al*. 2018 | 223 | 9–10 | Iraq | Perm 1st molar | Portable OBF gauge/meter |  | 125 | 117.23 | 98 | 106.83 | 125 | 134.470 | 125 | 120.957 | N |
| 23 | Araujo *et al*. 2016 | 204 | 8–10 | Brazil | Perm 1st molar | Dynamometer | 267.697.1 |  |  |  |  |  |  |  |  | N |
| 24 | Marquezin *et al*. 2016 | 116 | 7–11 | Brazil | Perm 1st molar | Dynamometer |  | 52 | 268.51Nil | 64 | 259.76Nil | 22 |  | 22 |  | N |
| 25 | Ferreira *et al*. 2016 | 20 | 8–11 | Brazil | Posterior molar with greatest bite force | Dynamometer |  |  |  |  |  | 20 | 30.864.23 | 20 | 27.53.5 | Kgs |
| 26 | Marquezin *et al*. 2017 | 65 | 7–13 | Brazil | Perm 1st molar | Dynamometer |  |  |  |  |  | 65 | 199.9342.90 | 65 | 185.9539.44 | N |
| 27 | Diaz-Serrano *et al*. 2017 | 10 | 7–11 | Brazil | Perm 1st molar | Dynamometer | 114.6815.98 |  |  |  |  | 10 | 118.5614.61 | 10 | 110.8117.35 | N |
| 28 | Oueis *et al*. 2009 | 42 | 9–11 | Tokyo | CO | Dental Pre Scale | 604241.8 |  |  |  |  |  |  |  |  | N |
| 29 | Antonarakis *et al*. 2012 | 25 | 9–13 | Sweden | Perm 1st molar | Bite force Recorder | 478.8121.8 |  |  |  |  |  |  |  |  | N |
| Permanent Dentition |
| 1 | Kamegai *et al*. 2005 | 902 | 12–14 | Japan | Perm 1st molar | Portable OBF gauge/meter | 480.2162.4 | 441 | 514.9165.6 | 461 | 448.7153 |  |  |  |  |  |
| 2 | Kamegai *et al*. 2005 | 600 | 15–17 | Japan | Perm 1st molar | Portable OBF gauge/meter | 462.3187.3 | 269 | 545.3182.8 | 331 | 395.2162.5 |  |  |  |  |  |
| 3 | Varga *et al*. 2011 | 30 | 15 | Croatia | Perm 1st molar | Portable OBF gauge/meter |  | 15 | 522.3181.7 | 15 | 465.1234.55 | 15 | 523.4184.58 | 15 | 521.3180.21 |  |
| 4 | Varga *et al*. 2011 | 30 | 18 | Croatia | Perm 1st molar | Portable OBF gauge/meter |  | 14 | 777.778.7 | 16 | 481.6190.42 | 14 | 776.477.32 | 14 | 77980.59 |  |
| 5 | Sun *et al*. 2016 | 562 | 13–16 | Taiwan | Perm 1st molar | Portable OBF gauge/meter |  | 279 | 34.5318.02 | 283 | 25.2313.85 |  |  |  |  | Kgs |
| 6 | Alam *et al*. 2020 | 49 | 14–18 | KSA | Perm 1st molar | Portable OBF gauge/meter |  |  |  |  |  | 49 | 302.939195.930 | 49 | 265.041199.318 | N |
| 7 | Awawdeh *et al*. 2017 | 21 | 14–19 | Jordan | Perm 1st molar | Portable OBF gauge/meter | 214.16Nil |  |  |  |  |  |  |  |  | N |
| 8 | Varga *et al*. 2017 | 86 | 14–19 | Croatia | Perm 1st molar | Portable OBF gauge/meter | 0.5350.195 | 36 | 0.6250.190 | 50 | 0.4710.174 |  |  |  |  | KN |
| 9 | Kaya *et al*. 2017 | 50 | 12–14 | Turkey | CO | Bite force recorder | 355.8131 |  |  |  |  | 25 | 197.2892.14 | 25 | 158.5271.87 | N |
| 10 | Kampe *et al*. 1987 | 13 | 16–18 | Sweden | Perm 1st molar | Bite force recorder | 532189 |  |  |  |  |  |  |  |  | N |
| 11 | Kampe *et al*. 1987 | 16 | 16–18 | Sweden | Perm 1st molar | Bite force recorder | 516151 |  |  |  |  |  |  |  |  | N |
| 12 | Thongudomporn *et al*. 2009 | 151 | 12–14 | Thailand | 1st pre molar–perm 2nd molar | Force sensing resistor | 916.2276.2 | 61 | 1001.6268.9 | 90 | 858.4267.3 | 151 | 654.8205.6 | 151 | 652.7192.1 | N |
| 13 | Sakashita *et al*. 2006 | 70 | 13–15 | Japan | Perm 2nd mand molar | Pressurized Transducer |  | 26 | 47.0815.2 | 44 | 40.5712.53 |  |  |  |  | Kgs |
| 14 | Bonjardim *et al*. 2005 | 20 | 12–18 | Brazil | perm 1st molar | Pressurized Transducer | 325.923.96 | 10 | 320.00827.783 | 10 | 331.78219.06 |  |  |  |  | N |
| 15 | Pereira *et al*. 2007 | 20 | 12–18 | Brazil | Perm 1st molar | Pressurized Transducer | 32640 |  |  |  |  |  |  |  |  | N |
| 16 | Pedroni-Pereira *et al*. 2018 | 32 | 14–17 | Brazil | Perm 1st molar | Dynamometer | 491.09204.23 |  |  |  |  |  |  |  |  | N |
| 17 | Alkan *et al*. 2006 | 10 | 15–19 | Turkey & Japan | CO | Dental Pre Scale | 773184 |  |  |  |  |  |  |  |  | N |
| 18 | Al Qassar *et al*. 2016 | 11 | 18–19 | Greece | Perm 1st molar | Bite force sensor | 656.68Nil | 6 | 678.81Nil | 5 | 630.11NIL |  |  |  |  | N |
| COMBINATION DENTITION |
| 1 | Markus Martini *et al*. 2017 | 25 | 5–9 | Germany | Perm 1st molar/Pri 2nd molar | Bite fork |  |  |  |  |  | 25 | 211.6861.3 | 25 | 202.5157.02 | N |
| 2 | Kiriishi *et al*. 2018 | 38 | 9–15 | Japan | CO | Dental Pre Scale |  | 38 | 463.82177.62 |  |  |  |  |  |  | N |
| 3 | Jeong *et al*. 2018 | 120 | 10–19 | Gangnam | CO | Dental Pre Scale | 410.9194.7 |  |  |  |  |  |  |  |  | N |
| 4 | Fields *et al*. 1986 | 10 | 11–15 | Michigan | Perm 1st molar | Pressurized Transducer | 16.18.5 |  |  |  |  |  |  |  |  | Kgs |
| 5 | Usui *et al*. 2007 | 70 | 12–14 | Japan | Perm 1st max molar | Portable OBF gauge/meter |  | 30 | 37.516.3 | 40 | 32.012.8 |  |  |  |  | KgF |
| 6 | Usui *et al*. 2007 | 70 | 15–19 | Japan | Perm 1st max molar | Portable OBF gauge/meter |  | 30 | 43.215.8 | 40 | 40.715.0 |  |  |  |  | KgF |
| 7 | Szymanska *et al*. 2015 | 120 | 7–17 | Poland | Perm 1st molar | Portable OBF gauge/meter |  | 60 | 295.66Nil | 60 | 263.64Nil | 120 | 275.74Nil | 283.55 | 120Nil | N |
| 8 | Takeshima *et al*. 2019 | 80 | 4–19 | Japan | Pri 1st and 2nd molar | Portable OBF gauge/meter | 0.669Nil |  |  |  |  |  |  |  |  | KN |
| 9 | Sonnaville *et al*. 2021 | 169 | 6–18 | Netherlands | CI | Portable OBF gauge/meter | 155.468.1 |  |  |  |  |  |  |  |  | N |
| 10 | Zwir *et al*. 2018 | 20 | 6–18 | Brazil | Perm 1st molar | Dynamometer |  |  |  |  |  | 20 | 313.2Nil | 314.7 | 20Nil | N |
| 11 | Roldan *et al*. 2016 | 380 | 7–16 | Columbia | Perm 1st molar (Right) | Occlusal Force Transducer |  | 198 | 53.842Nil | 182 | 48.94Nil |  |  |  |  | Kgs |

(n = sample size; Pri = Primary; Perm = Permanent; Max = Maxillary; Mand = Mandibular; N = Newton; Kgs = Kilograms; KN = KiloNewtons, KgF = Kilogram Force; CO = Centric Occlusion; CI = Central Incisors; 1st—first; 2nd—second).