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 |
| Mean  sd | n | Mean  sd | n | Mean  sd | n | Mean  sd | n | Mean  sd |
| Primary Dentition | | | | | | | | | | | | | | | | | |
| 1 | Kamegai *et al*. 2005 | 72 | 3–5 | Japan | Pri 2nd molar | Portable OBF gauge/Meter | | 196  96.1 | 36 | 186.2  96.3 | 37 | 203.4  97.0 |  |  |  |  | N |
| 2 | Ohira *et al*. 2011 | 98 | 4–6 | Japan | Pri  2nd molar | Portable OBF gauge/Meter | |  | 50 | 208  46.2 | 48 | 201  36.1 |  |  |  |  | N |
| 3 | Hama *et al*. 2017 | 128 | 4–5 | Japan | Pri molars | Portable OBF gauge/Meter | | 185.11  89.23 |  |  |  |  |  |  |  |  | N |
| 4 | Hama *et al*. 2017 | 134 | 5–6 | Japan | Pri molars | Portable OBF gauge/Meter | | 234. 14  99.66 |  |  |  |  |  |  |  |  | N |
| 5 | Abu-Alhaija *et al*. 2018 | 1085 | 3–6 | Jordan | Pri  2nd molar | Portable OBF gauge/Meter | | 197.42  65.74 | 515 | 207.8  67.66 | 570 | 188.31  62.68 | 1085 | 203.12  68.57 | 1085 | 191.72  67.75 | N |
| 6 | Owais *et al*. 2018 | 22 | 4–6 | Jordan | Pri 2nd molar | Portable OBF gauge/Meter | |  |  |  |  |  | 22 | 146.02  Nil | 22 | 150.00  Nil | N |
| 7 | Maria Beatriz *et al*. 2007 | 15 | 3–6 | Brazil | Pri molars | Pressurized rubber tube | | 235.12  44.48 |  |  |  |  |  |  |  |  | N |
| 8 | Rentes *et al*. 2002 | 30 | 3–6 | Brazil | Pri molars | Pressurized  Transducer | | 234.66  42.98 |  |  |  |  |  |  |  |  | N |
| 9 | Castelo *et al*. 2010 | 14 | 4–6 | Brazil | Pri molars | Pressurized  Transducer | | 287  50.63 |  |  |  |  |  |  |  |  | N |
| 10 | Castelo *et al*. 2010 | 19 | 4–6 | Brazil | Pri molars | Pressurized  Transducer | | 280.46  48.31 |  |  |  |  |  |  |  |  | N |
| 11 | Karibe *et al*. 2003 | 20 | 3–6 | Japan | Pri  1st and 2nd molar | Dental Pre Scale | |  |  |  |  |  | 20 | 48.4  35.8 | 20 | 46  36 | N |
| 12 | Oueis 2009 | 24 | 4–6 | Tokyo | CO | Dental Pre Scale | | 385.1  148.2 |  |  |  |  |  |  |  |  | N |
| 13 | Sato *et al*. 2011 | 45 | 5–6 | Japan | Data not available | Dental Pre Scale | | 278  122 |  |  |  |  |  |  |  |  | N |
| 14 | Mountain *et al*. 2011 | 199 | 3–6 | UK | Pri  1st and 2nd molar | Single tooth bite force gauge | | 196.6  69.77 | 120 | 188.78  66.73 | 85 | 166.83  77.83 | 199 | 179.74  72.15 | 199 | 175.07  66.9 | N |
| 15 | Heydari *et al*. 2018 | 49 | 3–6 | Tehran | Pri  1st and 2nd molar | Flexiforce Sensor | | 337.9  102.73 | 30 | 353.1  88.53 | 19 | 293.18  103.19 | 49 | 338.43  105.84 | 49 | 321.31  90.72 | N |
| 16 | Su *et al*. 2009 | 201 | 4–6 | Kaohsiung, Taiwan | Pri molars | Bite force MPM 3000 | | 5.69  4.19 |  |  |  |  | 201 | 4.47  4.11 | 201 | 4.16  3.63 | Kgs |
| Mixed Dentition | | | | | | | | | | | | | | | | | |
| 1 | Fields *et al*. 1986 | 17 | 6–12 | Michigan | Perm 1st molar | | Pressurized transducer | 15.2  10.38 |  |  |  |  |  |  |  |  | Kgs |
| 2 | Maki *et al*. 2001 | 61 | 7 | Japan | Perm  1st molar | | Pressurized transducer |  |  | 22.2  4.2 |  | 21.9  3.1 |  |  |  |  | Kgs |
| 3 | Maki *et al*. 2001 | 72 | 8 | Japan | Perm  1st molar | | Pressurized transducer |  |  | 22.7  3.3 |  | 22.3  2.7 |  |  |  |  | Kgs |
| 4 | Maki *et al*. 2001 | 75 | 9 | Japan | Perm  1st molar | | Pressurized transducer |  |  | 29.4  3.7 |  | 27  4.4 |  |  |  |  | Kgs |
| 5 | Sonnesen *et al*. 2001 | 26 | 7–13 | Denmark | Perm 1st mand molar | | Pressurized rubber tube | 382.2  63.9 |  |  |  |  | 26 | 386.2  62.9 | 26 | 378.3  70.6 | N |
| 6 | Sonnesen *et al*. 2005 | 88 | 7–13 | Denmark | Perm 1st mand molar | | Pressurized rubber tube | 362.2  72.7 | 40 | 370.4  64.8 |  |  | 48 | 355.3  78.7 |  |  | N |
| 7 | Gaviao *et al*. 2006 | 15 | 7–10 | Brazil | Perm 1st molar | | Pressurized rubber tube | 441.63  44.3 |  |  |  |  |  |  |  |  | N |
| 8 | Sonnesen *et al*. 2007 | 19 | 7–11 | Denmark | Perm 1st mand molar | | Pressurized rubber tube | 293.18  67.33 |  |  |  |  |  |  |  |  | N |
| 9 | Castelo *et al*. 2010 | 13 | 5–7 | Brazil | Pri molars | | Pressurized rubber tube | 352.81  23.67 |  |  |  |  |  |  |  |  | N |
| 10 | Castelo *et al*. 2010 | 14 | 5–7 | Brazil | Pri molars | | Pressurized rubber tube | 333.02  44.18 |  |  |  |  |  |  |  |  | N |
| 11 | Lemos *et al*. 2006 | 36 | 7–12 | Brazil | Perm molars | | Pressurized rubber tube | 410.07  52.32 | 19 | 418.04  65.79 | 17 | 401.16  30.96 |  |  |  |  | N |
| 12 | Serra *et al*. 2007 | 22 | 6–9 | Brazil | Perm 1st molar | | Pressurized rubber tube | 302  61 | 10 | 295  58 | 10 | 309  66 |  |  |  |  | N |
| 13 | Kamegai *et al*. 2005 | 486 | 6–8 | Japan | Perm 1st molar | | Portable OBF gauge/meter | 296.3  128.1 | 226 | 313  136.3 | 260 | 281.7  119 |  |  |  |  | N |
| 14 | Kamegai *et al*. 2005 | 533 | 9–11 | Japan | Perm 1st molar | | Portable OBF gauge/meter | 393.3  138.5 | 276 | 416.1  133.3 | 257 | 369.5  140.2 |  |  |  |  | N |
| 15 | Usui *et al*. 2007 | 70 | 7–9 | Japan | Perm 1st max molar | | Portable OBF gauge/meter |  | 30 | 26.2  9.1 | 40 | 20.9  10.9 |  |  |  |  | KgF |
| 16 | Usui *et al*. 2007 | 70 | 10–11 | Japan | Perm 1st max molar | | Portable OBF gauge/meter |  | 30 | 35.1  13.2 | 40 | 26.2  13.0 |  |  |  |  | KgF |
| 17 | Haritha *et al*. 2012 | 40 | 8–12 | India | Perm 1st molar | | Portable OBF gauge/meter | 191.17  11.47 | 20 | 183.07  28.81 | 20 | 199.27  33.93 |  |  |  |  | N |
| 18 | Antonarakis *et al*. 2015 | 20 | 9–13 | Geneva | Perm 1st molar | | Portable OBF gauge/meter | 422.8  107.1 |  |  |  |  |  |  |  |  | N |
| 19 | Al-Khateeb *et al*. 2015 | 33 | 10–13 | Jordan | Perm 1st molar | | Portable OBF gauge/meter | 325.5  95.2 | 17 | 352.1  99.1 | 16 | 274.7  64 |  |  |  |  | N |
| 20 | Subramaniam *et al*. 2016 | 24 | 6–9 | India | Pri molars | | Portable OBF gauge/meter |  |  |  |  |  | 8 | 104.6  37.1 | 8 | 80.7  38.6 | N |
| 21 | Medhat *et al*. 2018 | 177 | 8–9 | Iraq | Perm 1st molar | | Portable OBF gauge/meter |  | 80 | 106.4  34.6 | 97 | 104.3  31 | 80 | 129  61.4 | 80 | 110.5  49.6 | N |
| 22 | Medhat *et al*. 2018 | 223 | 9–10 | Iraq | Perm 1st molar | | Portable OBF gauge/meter |  | 125 | 117.2  3 | 98 | 106.8  3 | 125 | 134.4  70 | 125 | 120.9  57 | N |
| 23 | Araujo *et al*. 2016 | 204 | 8–10 | Brazil | Perm 1st molar | | Dynamometer | 267.6  97.1 |  |  |  |  |  |  |  |  | N |
| 24 | Marquezin *et al*. 2016 | 116 | 7–11 | Brazil | Perm 1st molar | | Dynamometer |  | 52 | 268.51  Nil | 64 | 259.76  Nil | 22 |  | 22 |  | N |
| 25 | Ferreira *et al*. 2016 | 20 | 8–11 | Brazil | Posterior molar with greatest bite force | | Dynamometer |  |  |  |  |  | 20 | 30.86  4.23 | 20 | 27.5  3.5 | Kgs |
| 26 | Marquezin *et al*. 2017 | 65 | 7–13 | Brazil | Perm 1st molar | | Dynamometer |  |  |  |  |  | 65 | 199.93  42.90 | 65 | 185.95  39.44 | N |
| 27 | Diaz-Serrano *et al*. 2017 | 10 | 7–11 | Brazil | Perm 1st molar | | Dynamometer | 114.68  15.98 |  |  |  |  | 10 | 118.56  14.61 | 10 | 110.81  17.35 | N |
| 28 | Oueis *et al*. 2009 | 42 | 9–11 | Tokyo | CO | | Dental Pre Scale | 604  241.8 |  |  |  |  |  |  |  |  | N |
| 29 | Antonarakis *et al*. 2012 | 25 | 9–13 | Sweden | Perm 1st molar | | Bite force Recorder | 478.8  121.8 |  |  |  |  |  |  |  |  | N |
| Permanent Dentition | | | | | | | | | | | | | | | | | |
| 1 | Kamegai *et al*. 2005 | 902 | 12–14 | Japan | Perm 1st molar | Portable OBF gauge/meter | | 480.2  162.4 | 441 | 514.9  165.6 | 461 | 448.7  153 |  |  |  |  |  |
| 2 | Kamegai *et al*. 2005 | 600 | 15–17 | Japan | Perm 1st molar | Portable OBF gauge/meter | | 462.3  187.3 | 269 | 545.3  182.8 | 331 | 395.2  162.5 |  |  |  |  |  |
| 3 | Varga *et al*. 2011 | 30 | 15 | Croatia | Perm 1st molar | Portable OBF gauge/meter | |  | 15 | 522.3  181.7 | 15 | 465.1  234.55 | 15 | 523.4  184.58 | 15 | 521.3  180.21 |  |
| 4 | Varga *et al*. 2011 | 30 | 18 | Croatia | Perm 1st molar | Portable OBF gauge/meter | |  | 14 | 777.7  78.7 | 16 | 481.6  190.42 | 14 | 776.4  77.32 | 14 | 779  80.59 |  |
| 5 | Sun *et al*. 2016 | 562 | 13–16 | Taiwan | Perm 1st molar | Portable OBF gauge/meter | |  | 279 | 34.53  18.02 | 283 | 25.23  13.85 |  |  |  |  | Kgs |
| 6 | Alam *et al*. 2020 | 49 | 14–18 | KSA | Perm 1st molar | Portable OBF gauge/meter | |  |  |  |  |  | 49 | 302.939  195.930 | 49 | 265.041  199.318 | N |
| 7 | Awawdeh *et al*. 2017 | 21 | 14–19 | Jordan | Perm 1st molar | Portable OBF gauge/meter | | 214.16  Nil |  |  |  |  |  |  |  |  | N |
| 8 | Varga *et al*. 2017 | 86 | 14–19 | Croatia | Perm 1st molar | Portable OBF gauge/meter | | 0.535  0.195 | 36 | 0.625  0.190 | 50 | 0.471  0.174 |  |  |  |  | KN |
| 9 | Kaya *et al*. 2017 | 50 | 12–14 | Turkey | CO | Bite force recorder | | 355.8  131 |  |  |  |  | 25 | 197.28  92.14 | 25 | 158.52  71.87 | N |
| 10 | Kampe *et al*. 1987 | 13 | 16–18 | Sweden | Perm 1st molar | Bite force recorder | | 532  189 |  |  |  |  |  |  |  |  | N |
| 11 | Kampe *et al*. 1987 | 16 | 16–18 | Sweden | Perm 1st molar | Bite force recorder | | 516  151 |  |  |  |  |  |  |  |  | N |
| 12 | Thongudomporn *et al*. 2009 | 151 | 12–14 | Thailand | 1st pre molar–perm 2nd molar | Force sensing resistor | | 916.2  276.2 | 61 | 1001.6  268.9 | 90 | 858.4  267.3 | 151 | 654.8  205.6 | 151 | 652.7  192.1 | N |
| 13 | Sakashita *et al*. 2006 | 70 | 13–15 | Japan | Perm 2nd mand molar | Pressurized Transducer | |  | 26 | 47.08  15.2 | 44 | 40.57  12.53 |  |  |  |  | Kgs |
| 14 | Bonjardim *et al*. 2005 | 20 | 12–18 | Brazil | perm 1st molar | Pressurized Transducer | | 325.9  23.96 | 10 | 320.008  27.783 | 10 | 331.782  19.06 |  |  |  |  | N |
| 15 | Pereira *et al*. 2007 | 20 | 12–18 | Brazil | Perm 1st molar | Pressurized Transducer | | 326  40 |  |  |  |  |  |  |  |  | N |
| 16 | Pedroni-Pereira *et al*. 2018 | 32 | 14–17 | Brazil | Perm 1st molar | Dynamometer | | 491.09  204.23 |  |  |  |  |  |  |  |  | N |
| 17 | Alkan *et al*. 2006 | 10 | 15–19 | Turkey & Japan | CO | Dental Pre Scale | | 773  184 |  |  |  |  |  |  |  |  | N |
| 18 | Al Qassar *et al*. 2016 | 11 | 18–19 | Greece | Perm 1st molar | Bite force sensor | | 656.68  Nil | 6 | 678.81  Nil | 5 | 630.11  NIL |  |  |  |  | N |
| COMBINATION DENTITION | | | | | | | | | | | | | | | | | |
| 1 | Markus Martini *et al*. 2017 | 25 | 5–9 | Germany | Perm 1st molar/Pri 2nd molar | Bite fork | |  |  |  |  |  | 25 | 211.68  61.3 | 25 | 202.51  57.02 | N |
| 2 | Kiriishi *et al*. 2018 | 38 | 9–15 | Japan | CO | Dental Pre Scale | |  | 38 | 463.82  177.62 |  |  |  |  |  |  | N |
| 3 | Jeong *et al*. 2018 | 120 | 10–19 | Gangnam | CO | Dental Pre Scale | | 410.9  194.7 |  |  |  |  |  |  |  |  | N |
| 4 | Fields *et al*. 1986 | 10 | 11–15 | Michigan | Perm 1st molar | Pressurized Transducer | | 16.1  8.5 |  |  |  |  |  |  |  |  | Kgs |
| 5 | Usui *et al*. 2007 | 70 | 12–14 | Japan | Perm 1st max molar | Portable OBF gauge/meter | |  | 30 | 37.5  16.3 | 40 | 32.0  12.8 |  |  |  |  | KgF |
| 6 | Usui *et al*. 2007 | 70 | 15–19 | Japan | Perm 1st max molar | Portable OBF gauge/meter | |  | 30 | 43.2  15.8 | 40 | 40.7  15.0 |  |  |  |  | KgF |
| 7 | Szymanska *et al*. 2015 | 120 | 7–17 | Poland | Perm 1st molar | Portable OBF gauge/meter | |  | 60 | 295.66  Nil | 60 | 263.64  Nil | 120 | 275.74  Nil | 283.55 | 120  Nil | N |
| 8 | Takeshima *et al*. 2019 | 80 | 4–19 | Japan | Pri 1st and 2nd molar | Portable OBF gauge/meter | | 0.669  Nil |  |  |  |  |  |  |  |  | KN |
| 9 | Sonnaville *et al*. 2021 | 169 | 6–18 | Netherlands | CI | Portable OBF gauge/meter | | 155.4  68.1 |  |  |  |  |  |  |  |  | N |
| 10 | Zwir *et al*. 2018 | 20 | 6–18 | Brazil | Perm 1st molar | Dynamometer | |  |  |  |  |  | 20 | 313.2  Nil | 314.7 | 20  Nil | N |
| 11 | Roldan *et al*. 2016 | 380 | 7–16 | Columbia | Perm 1st molar (Right) | Occlusal Force Transducer | |  | 198 | 53.842  Nil | 182 | 48.94  Nil |  |  |  |  | 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).