Supplementary Material

**Supplementary Table 1.** MEDLINE search strategy

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| **Conceptual groups** | **Search Terms** |
| **Children/adolescents (population)** | 1. adolescent/ or child/ or child, preschool/ 2. (child or children).ti,ab,kf. 3. (girl or girls). ti,ab,kf. 4. (boy or boys).ti,ab,kf. 5. (adolesc\* or preadolsc\* or pre-adolesc\*).ti,ab,kf.6. (teen\* or preteen\* pre-teen\*).ti,ab,kf. 7. (pubert\* or prepubert\* or pre-pubert\*).ti,ab,kf.8. (pubesc\* or prepubesc\* or pre-pubesc\*).ti,ab,kf. 9. (youth or youths).ti,ab,kf. 10. (juvenile or juveniles).ti,ab,kf. 11. (p?ediatric or p?ediatrics).ti,ab,kf. 12. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 |
| **Type 1 diabetes (exposure)** | 1. Diabetes Mellitus, Type 1/
2. (IDDM or T1DM or T1D or DM1).ti,ab,kf.
3. ((“insulin depend\*” or “insulin-depend\*” or “insulindepend\*).ti,ab,kf.
4. ((diabet\* or dm) adj3 (“type one” or “type 1” or “type I”)).ti,ab,kf.
5. ((juvenile or auto-immun\* or autoimmun\* or “sudden onset”) adj2 (diabet\* or DM)).ti,ab,kf.
6. 13 or 14 or 15 or 16 or 17
7. exp Diabetes Insipidus/
8. diabet\* insipidus.ti,ab,kf.
9. 19 or 20
10. 18 not 21
 |
| **Bone (outcomes)** | 23. exp Body Composition/24. (body adj3 (composition or distribution)).ti,ab,kf.1. ((fat or adipos\*) adj3 (volume or composition or distribution or mass or index or kg or kilogram or kilograms or total or total-body or whole or whole-body)).ti,ab,kf.
2. ((fat or adipos\*) adj3 (percentage or percent or “per cent” or %)).ti,ab,kf.
3. ((musc\* or lean or fat-free or “fat free”) adj3 (volume or composition or distribution or mass or index or kg or kilogram or kilograms or total or total-body or whole or whole-body)).ti,ab,kf.
4. ((musc\* or lean or fat-free or “fat free”) adj3 (percentage or percent or “per cent” or %)).ti,ab,kf.
5. ((android or gynoid or visceral or appendicular or abdominal or intra-abdominal) adj3 (fat or lean or muscle or mass or adipos\*)).ti,ab,kf.
6. 23 or 24 or 25 or 26 or 27 or 28 or 29
 |
| **Combined** | 1. 12 and 22 and 30
2. Limit: English
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Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Daily and Versions(R)

**Supplementary Table 2.** Inclusion/Exclusion criteria for study selection and excluded reports

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| --- | --- | --- | --- |
| Considered Items | Inclusion | Exclusion | Excluded Reports |
| Study Design | Cross-sectional studies or baseline from intervention or longitudinal studies compared with TDC | Follow-up or post-intervention data from intervention group in studies with interventionsStudies without compared to typically developing controls | No control groups (1–3) |
| Study population | Children and adolescents with diabetes mellitus, type 1 (mean or median age $\leq $18yrs) with (1) at least one year mean or median disease duration, and (2) no other conditions or medication potentially influencing body composition (e.g., hypertension) | Adults with diabetes mellitus, type 1 (mean or median age $>$18yrs)Children and adolescents with diabetes mellitus, type 1 with less than one year mean or median disease durationChildren and adolescents with diabetes mellitus, type 1 with other conditions or medication potentially influencing body composition (e.g., hypertension) | Participants without T1D (4)Adult participants with T1D (5)  |
| Outcomes | At least one of body fat %, lean mass%, total body fat and lean mass measured by DXA | Outcomes measured by other technology (e.g., bioelectrical impedance, skinfold thickness)No outcomes reported | Measured by bioelectrical impedance (6), and skinfold thickness (7)Did not measure or report total body composition outcomes (8–15)Did not measure or report total body composition outcomes for controls (16) |
| Publication date range  | Up to Jun 20, 2021 |  |  |
| Language restriction | English only | Not English |  |
| Publication type | Original study with full text and peer reviewed  | Non-original studies or without full text or peer review |  |
| Other | Human only | Animal study |  |

**Supplementary Table 3.** Newcastle-Ottawa quality assessment scale (adapted for cross sectional studies) (17)

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| --- | --- |
| **Categories** | **Questions** |
| **Selection** (5 stars max) | 1. Representativeness of the sample:
	1. Truly representative of the average in the target population. \* (all subjects or random sampling)
	2. Somewhat representative of the average in the target population. \* (non-random sampling)
	3. Selected group of users.
	4. No description of the sampling strategy.

*Note: If participants with type 1 diabetes and were recruited from medical clinics, like diabetes clinics, option b) would be selected*1. Sample size:
	1. Justified and satisfactory. \*
	2. Not justified.
2. Non-respondents:
	1. Comparability between respondents and non-respondents characteristics is established, and the response rate is satisfactory. \*
	2. The response rate is unsatisfactory, or the comparability between respondents and non-respondents is unsatisfactory.
	3. No description of the response rate or the characteristics of the responders and the non-responders.
3. Ascertainment of the exposure (risk factor):
	1. Validated measurement tool. \*\*
	2. Non-validated measurement tool, but the tool is available or described.\*
	3. No description of the measurement tool.

*Note: if diabetes were diagnosed with type 1 diabetes, option b) would be selected* |
| **Comparability** (2 stars max) | 1. The subjects in different outcome groups are comparable, based on the study design or analysis. Confounding factors are controlled.
	1. The study controls for the most important factor (Body mass/BMI (18,19)). \*
	2. The study control for any additional factor (e.g., sex, age, maturity, height (19–21)). \*
 |
| **Outcome** (3 stars max)  | 1. Assessment of the outcome:
	1. Independent blind assessment. \*\*
	2. Record linkage. (i.e., DXA-measured body composition) \*\*
	3. Self report. \*
	4. No description.
2. Statistical test:
	1. The statistical test used to analyze the data is clearly described and appropriate, and the measurement of the association is presented, including confidence intervals and the probability level (*p* value). \*
	2. The statistical test is not appropriate, not described or incomplete

 *Note: if body mass or BMI differed between groups, but not adjusted in statistical*  *analysis, it will be considered inappropriate statistical test, so option b) would be*  *selected* |

**Supplementary Table 4.** Includedstudy characteristics

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| **Reference** | **Design** | **T1D** **Sample Size (Sexes)****Demographics** Mean (SD) \* | **TDC****Sample Size (Sexes)****Demographics**Mean (SD) \* | **Outcomes** | **T1D**Mean (SD) \* | **TDC**Mean (SD) \* | **Key Findings** |
| Abd El Dayem et al. (2011)Egypt(22)  | Cross-sectional  | N=47 (14M,33F)Age: 13.3yrs (3.37)Height (SDS): -0.7 (1.0)Body mass (SDS): -0.04 (1.3)BMI: 22.0kg/m2 (8.0)Disease duration: 6.3yrs (3.0)HbA1c: 8.8% (2.1) Insulin dosage: 1.3 U/kg/day (0.5) | N=30 (12M, 18F)Age: 11.9yrs (2.98)BMI: 21.2kg/m2 (7.5)HbA1c: 5.6% (1.1)  | Body fat % | 35.2 (8.5) | 22.5 (5.6) | 56% higher body fat % and 17% lower lean mass % in children with T1D  |
| Lean mass % | 63.2 (8.6) | 76.1 (5.6) |
| Abd El Dayem & Battah (2012) Egypt(23) | Cross-sectional | N=25 (no hypertension)Age: 13.5yrs (3.1)Height (SDS): -0.7 (1.0)Body mass (SDS): -0.0 (1.3)BMI: 20.1kg/m2 (3.1)BMI (Z-score): 0.8 (0.8)Disease duration: 6.8yrs (2.1)HbA1c: 8.4% (2.0) Insulin dosage: 1.2 U/kg/day (0.3) | N=30 | Body fat % | 34.6 (8.7) | 22.5 (5.6) | Higher fat mass % in children with T1D (no hypertension)  |
| Ansell et al. (2020) US (24) | Cross-sectional | N=15 (9M, 6F)Age: 17.7yrs (1.7)Height: 170.3cm (8.3)Body mass: 67.3kg (8.6)BMI: 23.2kg/m2 (2.0)BMI percentile: 67 (20)HbA1c: median 8.3% [IQR 7.2-8.9]Disease duration: 6.9yrs (4.6) | N=28 (14M, 14F)Age: 17.6yrs (1.7)Height: 169.5cm (9.9)Body mass: 60.2kg (8.6)BMI: 20.9kg/m2 (1.7)BMI percentile: 44 (21)HbA1c: median 5.2% [IQR 4.8-5.6] | Body fat % | 23.0 (7.9) | 25.6 (8.7) | No difference in body fat %, fat and lean mass between children with T1D and TDC |
| Fat mass (kg) | 16.7 (5.8) | 13.4 (4.6) |
| Lean mass (kg) | 46.2 (8.7) | 43.7 (8.9) |
| Davis et al. (2012) †US(25)   | Follow-up | N=30 (18M, 12F)Age: 10.5yrs (2.9) at baselineHeight (SDS): 0.0 (1.0)Body mass (SDS): 0.1 (1.1)BMI (SDS): 0.2 (1.1)HbA1c: M: 8.8% (1.2) F: 7.8% (10) Disease duration: 1yrInsulin dosage: 0.9 U/kg/day (0.2)  | N=14 (8M, 6F)Age: 10.0 (2.9) at baselineHeight (SDS): 0.4 (1.5)Body mass (SDS): 0.1 (1.5)BMI (SDS): -0.2 (1.3) | Body fat % | 23.4 (5.8) | 24.4 (8.3) | No difference on body fat %, total body fat and lean mass between children with T1D at 1 year after diagnosis and TDC   |
| Fat mass (kg) | 9.2 (3.2) | 10.0 (6.5) |
| Lean mass (kg) | 30.9 (9.9) | 29.6 (9.6) |
| Devaraja et al. (2020)UK (26)   | Cross-sectional  | N=22 (9M,13F)Age: 13.8yrs (1.2)Height: 160.6cm (9.4)Body mass: 58.1kg (14.6)BMI: 22.4kg/m2 (4.4)Disease duration: range from 2 months to 14.5yrsHbA1c: 62.4mmol (5.4)  | 22 (9M,13F)Age: 13.6yrs (1.2)Height: 159.7cm (10.2)Body mass: 49.8kg (10.2)BMI: 19.3kg/m2 (2.5)   | Body Fat % | 27.7 (7.1) | 25.0 (6.2) | 11-34% higher total body fat and lean mass in children with T1D; no difference on body fat % between children with T1D and TDCNo difference after adjusting for height and weight between children with T1D and TDC  |
| Fat mass (kg) | 16.8 (7.4) | 12.6 (4.4) |
| Lean mass (kg) | 41.5 (8.3) | 37.3 (7.74) |
| Gusso et al. (2017)New Zealand(27)  | Randomized controlled trial  | T1D Intervention Group:N=38 (20M, 18F)Age: 15.6yrs (1.3)Body mass: 69.8kg (95% CI 66.1–73.6)BMI: 23.5kg/m2 (95% CI 22.4–24.7)HbA1c: 8.8% (95% CI 8.4–9.3) Disease duration: 5.4yrs (3.4)T1D Control Group: N=15 (7M, 8F)Age: 15.5yrs (0.9)Body mass: 69.2kg (95% CI 63.3–75.1)BMI: 24.6kg/m2 (95% CI 22.8–26.4)HbA1c: 8.6% (95% CI 7.8–9.3) Disease duration: 7.5yrs (4.0) | N=22 (10M, 12F)Age: 16.7yrs (1.5)Body mass: 64.6kg (95% CI 59.5–69.7)BMI: 23.0kg/m2 (95% CI (21.4–24.5)HbA1c: 5.2% (95% CI (4.4–5.9)  | Body Fat % | T1D Intervention26.8 (8.6) | TDC Intervention27.9 (8.9) | No difference on body fat % across T1D intervention, control groups and non-diabetic controls at baseline  |
|  | T1D Control27.3 (8.5) |  |
| Heap et al. (2004)US(28)  | Cross-sectional  | N=55 (30M,25F)Age:M: 14.6yrs (1.7)F: 14.7yrs (1.9)Height:M: 165.4cm (13.1)F: 161.8cm (8.2)Body mass: M: 62.4 kg (17.0)F: 61.3 kg (17.8)BMI:M: 22.6 kg/m2 (4.7)F: 23.2 kg/m2 (5.2)Disease duration:Tanner Stage II: 3.8yrs (3.7)Tanner Stage III: 3.7yrs (3.0)Tanner Stage IV: 5.8yrs (4.3)Tanner Stage V: 6.7yrs (3.6)Average HbA1c:Tanner Stage II: 9.4% (2.6) Tanner Stage III: 8.0% (0.7) Tanner Stage IV: 9.0% (1.5) Tanner Stage V: 9.0% (1.4) Insulin dosage: Tanner Stage II: 0.8 U/kg/day (0.3) Tanner Stage III: 1.0 U/kg/day (0.2)Tanner Stage IV: 1.0 U/kg/day (0.3)Tanner Stage V: 0.9 U/kg/day (0.3) | N=95 (42M,53F)Age: M: 14.5yrs (1.9)F: 14.8yrs (1.5)Height: M: 166.8cm (12.2)F: 161.0cm (8.3)Body mass:M: 58.2 kg (13.7)F: 57.8 kg (15.7)BMI:M: 20.7 kg/m2 (3.2)F: 22.1 kg/m2 (4.9) | Body fat %  | 23.8 (8.3) | 23.6 (8.5) | No difference on body fat % and total body lean mass between children with T1D and TDC |
| Lean mass (kg) | 42.1 (10.4) | 41.1 (10.9) |
| Ingberg et al. (2003);Sweden(29) | Cross-sectional  | N=18 (18F)Age: 17.3yrs (0.6)Height: 166.0cm (7.0)Body mass: 72.6kg (8.4)BMI: 26.3kg/m2 (2.6)Disease duration: 9.3yrs (3.2)HbA1c: 8.0% (1.1) Insulin dosage: 1.1 U/kg/day (0.3) | N=18 (18F)Age: 17.3yrs (0.6)Height: 170cm (6)Body mass: 65.8kg (12.5)BMI: 23.6kg/m2 (3.8) | Body Fat % | 37.1 (5.5) | 32.1 (7.7) | 16% higher body fat % and 24% higher total body fat mass in girls with T1D |
| Fat mass (kg) | 27.2 (6.5) | 21.9 (8.8) |
| Joseph et al. (2020) US(30)   | Cross-sectional   | N=62 (62F)Age: 13.6yrs (1.7)Height (Z-score): 0.3 (1.1)Body mass (Z-score): 0.7 (0.8)BMI (Z-score): 0.7 (0.7)Diabetes duration: 4.8yrs (3.2)HbA1c: 8.6% (1.3)Insulin dosage: 0.9 U/kg/day (0.2) | N=61 (61F)Age: 13.6yrs (1.9)Height (Z-score): 0.4 (0.9)Body mass (Z-score): 0.4 (0.9)BMI (Z-score): 0.3 (0.8)HbA1c: 5.4% (0.3)   | Body fat % | 31.9 (5.7) | 31.7 (5.7) | No difference on body fat %, total body fat and lean mass between children with T1D and TDC   |
| Fat mass (kg) | 18.4 (6.3) | 17.1 (5.7) |
| Lean mass (kg) | 36.5 (6.1) | 34.2 (6.8) |
| Karaguzel et al. (2006) Turkey (31) | Cross-sectional | N=49 (26M,23F)Age: 11.3yrs (2.8)Body mass: M: 38.4kg (10.9)F: 37.2kg (15.2)BMI: 17.9kg/m2 (3.0)Disease duration:M: 4.2yrs (3.1)F: 3.9yrs (3.0)Average HbA1c:HbA1c (<8%): N=18HbA1C (>8%): N=31Insulin dosage: 0.9 U/kg/day (0.3) | N=37 (20M,17F)Age: 11.0yrs (3.1)Body mass: M: 42.5 (14.2)F: 37.2 (14.8)BMI: 18.2kg/m2 (3.0)  | Lean mass (kg)   | Male28.0 (9.5) | 28.8 (13.0) | No difference on total body fat and lean mass between children with T1D and TDC  |
|   | Female21.6 (7.4) | 22.4 (8.5) |
| Fat mass (kg)  | Male9.0 (3.0)Female12.5 (6.4) | 9.0 (4.4)12.8 (6.0) |
| Komatsu et al. (2005)Brazil(32)   | Cross-sectional   | N=72 (38M,34F)Age: median 16yrs (range 9-20)Height: 160cm (12)Body mass: 56.0kg (13.4)BMI: 21.5kg/m2 (3.7)Disease duration: 4.9yrs (3.6)HbA1c: 8.1% (2.2) Insulin dosage: 1.0 U/kg/day (0.4) | N=46 (26M,20F)Age: median 16yrs (range 10-18)Height: 166cm (10)Body mass: 58.2kg (12.7)BMI: 20.8kg/m2 (2.8)HbA1c: 5.2% (0.9)  | Body fat % | 22.4 (7.8) | 19.7 (7.2)  | No difference on body fat %, total body fat and lean mass between children with T1D and TDC   |
| Fat mass (kg) | 12.4 (5.0) | 11.6 (4.7) |
| Lean mass (kg) | 41.2 (10.0)  | 45.0 (9.5) |
| Krishnan et al. (2011)US(33)     | Cross-sectional    | N=29Normal Weight (N=14; 9M,5F)Age: 15.9yrs (2.3)Height: 162.5cm (23.7)Body mass: 59.0kg (11.3)BMI: 20.6kg/m2 (2.0)BMI percentile: 50.7% (21.6)Disease duration: >3yrs HbA1c: 8.8% (1.3) Overweight (N=15; 10M,5F)Age: 16.3yrs (2.2)Height: 171.1cm (8.7)Body mass: 84.3kg (17.6)BMI: 28.5kg/m2 (3.6)BMI percentile: 93.1% (4.2)Disease duration: >3yrsHbA1c: 8.2% (1.0)  | N=37Normal Weight (N=14; 6M,8F)Age: 16.5yrs (2.6)Height: 167.2cm (6.9)Body mass: 57.4kg (7.5)BMI: 20.5kg/m2 (1.5)BMI percentile: 47.3% (17.1)HbA1c: 5.1% (0.3) Overweight (N=23; 13M,10F)Age: 15.6yrs (2.1)Height: 168.3cm (9.9)Body mass: 93.7kg (19.9)BMI: 32.9kg/m2 (5.6)BMI percentile: 96.6% (3.2)HbA1c: 5.4% (0.2)  | Body fat % | Normal Weight | No difference on body fat %, total body fat mass between children with T1D and TDC  |
|  | 24.3 (1.7) | 21.4 (1.6) |
|  | Overweight36.7 (2.7) | 36.5 (1.7) |
| Fat mass (kg) | Normal Weight |
|   | 13.4 (1.1) | 11.3 (1.1) |
|  | Overweight29.9 (4.2) | 36.2 (2.6) |
| Maggio et al. (2010)Switzerland(34) | Cross-sectional  | N=27 (13M,14F)Age: 10.5yrs (2.4)Height: 141.8cm (15.1)Body mass: 38.3kg (12.0)BMI: 18.5kg/m2 (12.0)Disease duration: 3.2yrs (SE 12.0)HbA1c: 7.9% (3.6) Insulin dosage: 0.8 U/kg/day (0.2) | N=32 (16M,16F)Age: 10.5yrs (2.5)Height: 143.1cm (15.8)Body mass: 37.3kg (13.0)BMI: 17.6kg/m2 (SE 2.6)HsbA1c: 5.4% (3.3)  | Lean mass (kg) | 28.5 (9.9) | 27.7 (9.1) | No difference on total body lean mass between children with T1D and TDC |
| Moyer-Mileur et al. (2004)US(35)    | Follow-up     | N=42 (26M,16F)Age:M: 14.9yrs (1.8)F: 14.1yrs (1.8)Height: M: 166cm (12)F: 161cm (7)Body mass:M: 62.1kg (23.8)F: 53.2kg (8.5)BMI:M: 23.4kg/m2 (6.9)F: 20.5kg/m2 (3.5)Disease duration: 4.2yrs (3.1)HbA1c: 8.2% (1.2) Insulin dosage: 0.9 U/kg/day (0.3) | N=199 (90M,109F)Age:M: 15.0yrs (2.1)F: 15.1yrs (1.9)Height: M: 168cm (12)F: 162cm (8)Body mass: M: 59.8kg (17.1)F: 58.2kg (15.4)BMI:M: 21.0kg/m2 (4.6)F: 22.1kg/m2 (4.8) | Body Fat % | 22.3 (7.5) | 23.4 (8.6) | 3% higher total body lean mass No difference on body fat % between children with T1D and TDC  |
|  | Male18.9 (6.1) | 18.1 (8.0) |
|  | Female27.8 (6.4) | 27.7 (6.4) |
| Lean mass (kg) | 43.0 (5.8) | 41.6 (7.1) |
| Moyer-Mileur et al. (2008)US(36)  | Cross-sectional  | N=11 (11F)Age: 12.9yrs (1.0)Height (SDS): 0.1 (1.0)BMI: 20.9kg/m2 (1.9)Disease duration: 5.9yrs (3.7)HbA1c: 8.1% (1.0) Insulin dosage: 1.0 U/kg/day (0.2) | N=10 (10F)Age: 13.1yrs (1.1)Height (SDS): 0.2 (0.6)BMI: 20.3kg/m2 (2.1)HbA1c: 4.9% (0.3)  | Body Fat %Lean mass (kg) | 29.8 (6.3)33.4 (5.4) | 29.1 (7.0)33.5 (5.4) | No difference on body fat % and total body lean mass between children with T1D and TDC  |
|  |  |  |
| Nadeau et al. (2010)*US* (37)    | Cross-sectional    | N=12 (6M,6F)Age: 14.8yrs (2.6)BMI: 20.9 kg/m² (3.1)Disease duration: 7.5yrs (4) HbA1c: 8.7% (1.6)  | N=12 (6M,6F)Age: 15.6yrs (1.8)BMI: 21.0 kg/m² (2.4)HbA1c: 4.9% (0.3)  | Body fat % | 22.0 (6.6) | 20.4 (10.6) | No difference on body fat % and lean mass %, total body fat and lean mass between children with T1D and TDC    |
| Fat mass (kg) | 13.4 (5.9) | 11.01 (6.4) |
| Lean mass % | 77.3 (6.6) | 79.4 (10.6) |
| Lean mass (kg) | 42.4 (6.5) | 44.8 (8.4) |
| Parthasarathy et al. (2016)India (38)  | Follow-up  | N=80 (39M, 41F)Age: 10.7yrs (3.4)Height: 132.3cm (18.1)Height (Z-score): –0.9 (1.1)Body mass: 28.9kg (11.8)Body mass (Z-score): –1 (0.9)BMI: 15.6kg/m2 (3.1)BMI (Z-score): –0.7 (0.8)HbA1c: 10% (2)  | N=54Age: 11.7yrs (2.8)Height: 144.7cm (15.2)Height (Z-score): 0 (0.9)Body mass: 35.0kg (11.2)Body mass (Z-score): –0.8 (3.4)BMI: 17.1kg/m2 (5.8)BMI (Z-score): –1.3 (5.7) | Body fat % | 20.3 (9.1) | 26.5 (12) | 23% less body fat % in children with T1DNo difference on lean mass %  |
| Lean mass % | 73.9 (9.0) | 70.7 (9.0) |
| Saki et al. (2017)Iran(39)   | Cross-sectional   | N=87 (39M,48F)Age: 12.4yrs (4.2)Height: 146.2cm (20.1)Body mass: 39.7kg (15.3)BMI: 17.8kg/m2 (3.2)Disease duration: 4.4yrs (2.8)HbA1c: 10.2% (2.2) Insulin dose: 0.7 U/kg/day (0.3) | N=87 (39M,48F)Age: 12.4yrs (4.2)Height: 151.1cm (16.4)Body mass: 41.3kg (13.8)BMI: 17.5kg/m2 (3) | Body fat % | 28.4 (5.8) | 23.4 (8.1) | 21% higher body fat % and 14% lower total body lean mass in children with T1DNo difference on total body fat mass between children with T1D and TDC  |
| Fat mass (kg) | 11.0 (5.1) | 9.9 (5.1) |
| Lean mass (kg)  | 26.3 (10.3) | 30.5 (10.3) |
| Santiprabhob et al. (2021)Thailand (40) | Cross-sectional | N=100 (44M,56F)Age: 14.5yr (2.7)Height: 156.3cm (11.2)Height (Z-score): 0.17 (1.2)Body mass: 52.7kg (14.6)Body mass (Z-score): 1.1 (1.7)BMI: 21.2kg/m2 (4.0)BMI (Z-score): 0.4 (1.1)Disease duration: median 5.8yre [IQR 3.0-9.1]HbA1c: 8.9% (1.8)Insulin dosage: 1.2 U/kg/day (0.3) | N=100 (44M,56F)Age: 14.3yr (2.7)Height: 158.4cm (11.7)Height (Z-score): 0.7 (1.2)Body mass: 54.1kg (15.0)Body mass (Z-score): 1.4 (1.8)BMI: 21.2kg/m2 (4.1)BMI (Z-score): 0.4 (1.1)HbA1c: 5.2% (0.3) | Lean mass (kg) | 34.5 (9.2) | 35.0 (9.4) | No difference on total body lean mass between children with T1D and TDC |
| Sarnblad et al. (2006)Sweden(41)   | Follow-up (baseline)   | N=23 (23F)Age: 15.7yrs (2.1)Height: 163.8cm (7.9)Body mass: median 65.3kg [IQR 16.0]BMI: median 23.6kg/m2 [IQR 2.6]BMI (SDS): 0.8 (0.8)Disease duration: median 6.0yrs [IQR 7.7]HbA1c: 7.6% (1.4) Insulin dosage: 1.1 U/kg/day (0.3) | N=19 (19F)Age: 15.6yrs (1.9)Height: 164.3cm (6.9)Body mass: median 57.2kg [IQR 24.1]BMI: median 20.5kg/m2 [IQR 8.0]BMI (SDS): 0.7 (1.2)   | Body fat % | 32.6 (8.3) | 31.0 (9.9) | No difference on body fat %, total body fat and lean mass between children with T1D and TDC   |
| Fat mass (kg) | 20.7 (7.6) | 20.0 (10.0) |
| Sarnblad et al. (2016)Sweden(42) | Cross-sectional | N=44 (44F)Age: 16.4yrs (1.9)Height: 165cm (7)Body mass: 66.7kg (11.0)BMI: 24.5kg/m2 (3.3)HbA1c: 70.1mmol/mol (13.2) Insulin dose: 1.1 U/kg/day (0.3) | N=49 (49F)Age: 16.8yrs (1.7)Height: 166cm (6)Body mass: 64.3kg (11.9)BMI: 23.1kg (3.7) | Body fat % | 34.9 (7.6) | 32.2 (8.3) | No difference on body fat % between children with T1D and TDC |
| Vinovskis et al. (2020)US(43)  | Cross-sectional  | N=50 (25M,25F)Age: 16.0yrs (3.0)Body mass: 67.5kg (17.6)BMI: 23.4kg/m2 (5.1)Disease duration: 5.7yrs (2.6)HbA1c: 8.7% (1.3)  | N=20 (6M,14F)Age: 16.1yrs (2.9)Body mass: 62.7kg (14.5)BMI: 22.7kg/m2 (3.7)HbA1c: 5.2% (0.2)  | Fat mass (kg) | 20.3 (9.4) | 19.2 (6.7) | No difference on total body fat mass between children with T1D and TDC  |
| Whalley et al. (2009)New Zealand(44) | Cross-sectional | N=11 (11F)Age: 15.5yrs (1.1)Height: 163cm (6)Body mass: 65.0kg (9.89)BMI: 24.5kg/m2 (3.6)Disease duration: median 66 months [IQR 13-128]HbA1c: 8.7% (1.0)  | N=9 (9F)Age: 14.9yrs (1.182)Height: 167cm (7)Body mass: 58.1kg (7.9)BMI: 20.8kg/m2 (2.0)HbA1c: 5.1% (0.21)  | Body fat % | 35.9 (7.8) | 28.1 (5.7) | 28% higher body fat % in children with T1D |
| Wu et al. (2021) China (45) | Cross-sectional | N=48 (18M,30F)Age: 14.0yrs (2.9)Height: 160cm (13)Body mass: 49.9kg (12.6)BMI: 19.0kg/m2 (3.1)BMI (Z-score): -0.3 (1.2)Disease duration: 3.6yrs (2.3)HbA1c: 61mmol/mol (9) or 7.7% (2.5)Insulin dosage: 0.9 U/kg/day (0.3) | N=19 (9M,11F)Age: 13.6yrs (3.5)Height: 159cm (13)Body mass: 52.3kg (15.5)BMI: 20.4kg/m2 (3.3)BMI (Z-score): 0.5 (1.0) | Body fat % | 29.3 (9.5) | 28.4 (6.6) | No difference on total body fat % between children with T1D and TDC |

Abbreviations: BMI: body mass index; CI: confidence interval; HbA1c: Hemoglobin A1c; IQR: interquartile range; SD: standard deviation; SDS: standard deviation score; SE: standard error; T1D: type 1 diabetes mellitus; TDC: typically developing children; U/kg/day: unit per kilogram per day.

\*Median, interquartile range, range, standard error, least square mean, and n specified below if mean (SD) not reported and n was specific to the results.

†Study characteristics and key findings shown at 1-year follow-up (disease duration = 1 year), since baseline was measured at diagnosis

**Supplementary Table 5.** Risk of bias assessment based on quality assessment from modified Newcastle-Ottawa Scale (17). Good and fair study quality translate to low and moderate risk of bias, respectively

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Selection(0-5 stars)\* | Comparability(0-2 stars) | Outcomes(0-3 stars) | Overall(0-9 stars)\* | Quality |
| Abd El Dayem et al. (2011) (22) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Abd El Dayem & Battah (2012) (23) | \*\*\* |  | \*\* | 5 | Fair |
| Ansell et al. (2020) (24) | \*\*\* |  | \*\*\* | 6 | Fair |
| Davis et al. (2012) (25) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Devaraja et al. (2020) (26) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Gusso et al. (2017) (27) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Heap et al. (2004) (28) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Ingberg et al. (2003) (29) | \*\*\* |  | \*\* | 5 | Fair |
| Joseph et al. (2020) (30) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Karaguzel et al. (2006) (31) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Komatsu et al. (2005) (32) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Krishnan et al. (2011) (33) | \*\*\* | \* | \*\*\* | 7 | Good |
| Maggio et al. (2010) (34) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Moyer-Mileur et al. (2004) (35) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Moyer-Mileur et al. (2008) (36) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Nadeau et al. (2010) (37) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Parthasarathy et al. (2016) (38) | \*\*\* |  | \*\* | 5 | Fair |
| Saki et al. (2017) (39) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Santiprabhob et al. (2021) (40) | \*\*\*\* | \* | \*\* | 8 | Good |
| Sarnblad et al. (2006) (41) | \*\*\* |  | \*\*\* | 6 | Fair |
| Sarnblad et al. (2016) (42) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Vinovskis et al. (2020) (43) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Whalley et al. (2009) (44) | \*\*\* | \*\* | \*\*\* | 8 | Good |
| Wu et al. (2021) (45) | \*\*\* | \* | \*\*\* | 7 | Good |

\*The highest possible score is 9, since question 3 in “Selection” section (non-respondents) was not applicable for all studies.

**Supplementary Table 6.** Meta-regression results correlating potential explanatory factors to the difference in means of body fat %

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Number of Studies** | **Unstandardized** $β$ | **95% Confidence Interval** | ***p*-value** |
| Sex (female ratio) | 18 | 4.7 | -3.7, 13.2 | 0.272 |
| Age | 17 | 0.3 | -1.0, 1.6 | 0.656 |
| Height | 13 | 0.1 | -0.2, 0.3 | 0.276 |
| Body Mass | 12 | 0.1 | -0.1, 0.3 | 0.277 |
| BMI | 16 | 0.5 | -0.6, 1.5 | 0.399 |
| HbA1c | 18 | -0.5 | -3.8, 2.9 | 0.784 |
| Age of onset | 12 | -2.3 | -3.5, -1.0 | <0.001 |
| Disease duration | 13 | 1.3 | -0.2, 2.7 | 0.085 |
| Insulin dose | 13 | 18.1 | 3.5, 32.6 | 0.015 |

**(A)** Lean mass (kg)

**(B)** Lean mass %

****

**Supplementary Figure 1.** Forest plots of total body **(A)** lean mass (kg), and **(B)** lean mass (%)

**(A)** Fat mass (kg)

**(B)** Body fat %



**(C)** Lean mass (kg)

**(D)** Lean mass (%)



**Supplementary Figure 2.** Re-displayed funnel plots for **(A)** fat mass (kg), **(B)** body fat %, **(C)** lean mass (kg), and **(D)** lean mass % after Duval and Tweedie’s Trim and Fill adjustment

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