Supplementary Appendix

This appendix has been provided by the authors to give readers additional information about their work.

Supplement to:

Gong Q, Zhang P, Wang J, et al. Efficacy of lifestyle intervention in adults with impaired glucose tolerance with and without impaired fasting plasma glucose: a post hoc analysis of Da Qing Diabetes Prevention Outcome Study

**Supplemental Figures and Tables.**

Figure S1. Flow chart of Da Qing Diabetes Prevention and Outcome Study.

Figure S2. Forest plots of effect of Co-variates on Diabetes incidence 10 years after randomisation in participants with baseline FPG of <100mg/dl (Panel A) and FPG ≥100mg/dl (Panel B).

Figure S3. Kaplan Meier plots of Cumulative incidence of Major long-term outcomes in intervention and control groups with baseline FPG <100 (Panel A) and ≥100 mg/dL (Panel B).

Supplemental Table 1. Diabetes incidence, Absolute risk reduction, and Hazard ratios (HRs) in Control, Diet, Exercise, and Diet+Exercise intervention groups with baseline FPG <100 or ≥100 mg/dL.

Supplemental Table 2. Thirty-year Incidence, Absolute risk reduction and Hazard ratios (HRs) of Major long-term outcomes in Control and Diet, Exercise, and Diet+Exercise intervention groups with baseline FPG <100 or ≥100 mg/dL.

**Figure S1. Flow chart of Da Qing Diabetes Prevention and Outcome Study.**

**138 participants randomised to**

**Control group.**

**1992**

**Trial completed\***

**1986**

**2006**

**576 persons with IGT identified by 75g OGTT were randomised by clinic to Control, or Diet, Exercise, or Diet+Exercise intervention groups**

**438 participants randomised to Intervention groups**

**FPG < 100 mg/dl N = 73**

**FPG ≥100 mg/dl N = 65**

**FPG ≥100 mg/dl N = 224**

**FPG < 100mg/dl N = 214**

**With diabetes: 37 (51%)**

 **Dead: 3 (4%)**

**Lost to follow-up**† **n=2 (3%)**

**With diabetes: 51 (78%)**

 **Dead: 2 (3%)**

 **Lost to follow-up**† **n=3 (5%)**

**With diabetes: 63 (86%)**

**Dead: 26 (36%)**

**Lost to follow-up**† **n=1 (1%)**

**With diabetes: 60 (92%)**

**Dead: 14 (22%)**

**Lost to follow-up**† **n=2 (3%)**

**With diabetes: 64 (30%)**

**Dead:10 (5%)**

**Lost to follow-up**†**:n=23 (11%)**

**With diabetes: 175 (78%)**

**Dead: 58 (26%)**

**Lost to follow-up**† **n=11 (5%)**

**With diabetes: 138 (64%)**

**Dead: 44 (21%)**

**Lost to follow-up: n=20 (9%)**

**With diabetes: 113 (50%)**

**Dead: 8 (4%)**

**Lost to follow-up**† **n=18 (8%)**

**\*After the original trial ended, all participants received routine medical care from their usual clinics and providers.**

† **Most loss to follow-up occurred between 1986 and 1992, during the trial, when some participants were relocated to a newly discovered oil field and could no longer receive intervention or follow-up at their assigned clinics in Da Qing; in 2006 and 2016, data were obtained for some participants who earlier had been reported as lost to follow-up.**

**2016**

**With diabetes: 66 (90%)**

**Dead: 40 (55%)**

**Lost to follow-up**† **n=1 (1%)**

**With diabetes: 60 (92%)**

**Dead: 36 (55%)**

**Lost to follow-up**† **n=2 (3%)**

**With diabetes: 183 (82%)**

**Dead: 98 (44%)**

**Lost to follow-up**† **n=13 (6%)**

**With diabetes: 154 (72%)**

**Dead: 87 (41%)**

**Lost to follow-up**† **n=20 (9%)**

**Participants divided by baseline FPG for this analysis**

**Figure S2. Forest plots of effect of Co-variates on Diabetes incidence 10 years after randomisation in participants with baseline FPG of <100mg/dl (Panel A) and FPG ≥100mg/dl (Panel B).**

** **

Abbreviations: FPG, fasting plasma glucose; BMI, body mass index; SBP, systolic blood pressure; HR: Hazard Ratio, CI, confidence interval.

**Figure S3. Kaplan-Meier plots of cumulative incidence of major long-term outcomes in intervention and control groups with baseline FPG <100 (Panel A) and** **≥100 mg/dL (Panel B).**













CVD events defined at the first occurrence of non-fatal or fatal myocardial infarction, non-fatal or fatal stroke or sudden death, or heart failure. Microvascular diseases defined as the first recognition of retinopathy, nephropathy, or neuropathy. CVD deaths are fatal CVD events.

**Analysis according to intervention groups used in the Daqing Diabetes Prevention study.**

Participants in the DQDPS were initially randomised by clinic into a Control group, or groups to receive either Diet only, Exercise, or Diet plus exercise interventions. Participants randomised to the control group were given written instructions concerning diet and leisure activity but received no formal individual instruction or group counseling. Participants assigned to the Diet only, Exercise, or Diet plus exercise groups received in-clinic group counseling once a month for 4 months and then once every 3 months for the remainder of the six-year trial. Details of the goals of the interventions are described elsewhere.1

As the incidence of diabetes at the end of the trial was similar in each of the original intervention groups and because of sample size considerations, for the DQDPOS, by design, the three groups were combined to determine if the reduced diabetes incidence subsequently resulted in differences in the incidence of diabetes-related complications. Outcomes according to the original trial assignments have been reported previously,2 but not when subdivided by baseline FPG.

Supplemental tables 1 and 2 show a sub-analysis of long-term outcomes on diabetes and its complications in the original intervention groups subdivided into those with baseline FPG >100mg/dL or ≥100mg/dL.

1. Pan XR, Li GW, Hu YH, et al. Effects of diet and exercise in preventing NIDDM in people with impaired glucose tolerance. The Da Qing IGT and Diabetes Study. Diabetes Care 1997;20:537-44.

2. Gong Q, Zhang P, Wang J, et al. Morbidity and mortality after lifestyle intervention for people with impaired glucose tolerance: 30-year results of the Da Qing Diabetes Prevention Outcome Study. Lancet Diabetes Endocrinol 2019;7:452-61(Supplementary appendix, Table S10).

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| --- |
| **Supplemental Table 1. Diabetes incidence, Absolute risk reduction, and Hazard ratios (HRs) in Control, Diet, Exercise, and Diet+ Exercise (D+E) intervention groups with baseline FPG<100 or ≥100 mg/dL.** |
| **Time after randomisation** | **Baseline FPG <100 mg/dL** | **Baseline FPG ≥100 mg/dL** |
| **Control** **N= 73** | **Diet****N= 69** | **Exercise****N= 83** | **D+E****N= 62** | **Control****N= 65** | **Diet****N= 79** | **Exercise****N= 72** | **D+E****N= 73** |
| **Six years** |  |
| No. of cases/person-years |  37/351 | 19/346 | 24/439 | 21/315 | 51/262 | 40/369 | 35/368 | 38/349 |
| Incidence: Cases/100 person-years (95% CI) | 10.54(7.14-13.94) | 5.49(3.02-7.96) | 5.47(3.28-7.65) | 6.67(3.82-95.2) | 19.47(14.12-24.80) | 10.84(7.48-14.20) | 9.51(6.36-12.66) | 10.89(7.43-14.35) |
| Cumulative Incidence (%),(95% CI) | 51.7(39.4-62.6) | 29.6(18.9-41.1) | 30.7(20.8-41.2) | 36.6(24.2-48.9) | 81.7(69.2-89.5) | 54.0(41.8-64.7) | 50.1(37.7-61.2) | 54.6(42.1-65.5) |
| % Diabetes free (95%CI) | 48.3 (37.4-60.6) | 70.4(58.9-81.1) | 69.3(58.8-79.2) | 63.4(51.1-75.8) | 18.3(10.5-30.8) | 46.0(35.3-58.2) | 49.9(38.8-42.3) | 45.4(34.5-57.9) |
| Absolute risk reduction (%) | - | 22.1 | 21.0 | 15.1 | **-** | 27.7 | 31.6 | 27.1 |
| Hazard Ratio (95% CI) | - | 0.52 (0.30-0.90) | 0.51(0.30-0.85) | 0.62(0.36-1.05) | **-** | 0.52(0.34-0.79) | 0.45(0.29-0.70) | 0.52(0.34-0.79) |
| Adjusted Hazard Ratio\* (95% CI) | - | 0.51(0.29-0.90) | 0.50(0.30-0.84) | 0.59(0.34-1.02) | **-** | 0.52(0.34-0.79) | 0.44(0.28-0.67) | 0.50(0.32-0.76) |
| **Ten years** |  |
| No. of cases/person-years |  44/473 | 25/506 | 31/637 | 29/433 |  56/298 | 48/488 | 40/490 | 47/461 |
| Incidence: Cases/100 person-years (95% CI) | 9.30(6.55-12.05) | 4.94(3.00-6.88) | 4.87(3.15-6.58) | 6.70(4.26-9.14) | 18.79(13.87-23.71) | 9.84(7.05-12.62) | 8.16(5.63-10.69) | 10.20(7.28-13.11) |
| Cumulative Incidence (%), (95% CI) | 61.6(49.1-71.9) | 39.8(27.5-51.8) | 40.1(29.0-50.9) | 52.0(37.9-64.4) | 96.7(84.9-99.3) | 83.6(72.2-90.7) | 82.0(68.8-90.0) | 89.8(79.2-95.1) |
| % Diabetes free (95%CI) | 38.4 (28.1-50.9) | 60.2(48.2-72.5) | 59.9(49.1-71.0) | 48.0(35.6-62.1) | 3.3 (0.7-15.1) | 16.4(9.3-27.8) | 18.0(10.0-31.2) | 10.2(4.9-20.8) |
| Absolute risk reduction (%) | **-** | 21.8 | 21.5 | 9.6 | **-** | 13.1 | 14.7 | 6.9 |
| Hazard Ratio (95% CI) | **-** | 0.54(0.33-0.88) | 0.52(0.33-0.83) | 0.71(0.44-1.13) | **-** | 0.53(0.37-0.76) | 0.43(0.30-0.63) | 0.59(0.41-0.84) |
| Adjusted Hazard Ratio\*(95% CI) | **-** | 0.55(0.33-0.90) | 0.53 (0.33-0.84) | 0.71(0.44-1.15) | **-** | 0.57(0.40-0.81) | 0.44(0.30-0.63) | 0.60(0.42-0.86) |
| **20 years** |
| No. of cases/person-years |  63/667 | 45/742 | 51/963 | 42/604 |  60/340 | 60/648 | 53/700 | 62/596 |
| Incidence: Cases/100 person-years (95% CI) | 9.44(7.11-11.78) | 6.06(4.29-7.84) | 5.30(3.84-6.75) | 6.95(4.85-9.06) | 17.65(13.18-22.11) | 9.26(6.92-11.60) | 7.57(5.51-9.63) | 10.40(7.81-12.99) |
| Cumulative Incidence (%), (95% CI) | 89.7(79.2-95.0) | 76.2(62.4-85.5) | 69.6(57.1-79.1) | 79.5(64.7-88.6) | 96.7(84.9-99.3) | 83.6(72.2-90.7) | 82.0(68.8-90.0) | 89.8(79.2-95.1) |
| % Diabetes free (95%CI) | 10.3(5.0-30.8) | 23.8(14.5-37.6) | 30.4(30.1-42.9) | 20.5(11.4-35.3) | 3.3(0.7-15.1) | 16.4(9.3-27.8) | 18.0(10.0-31.2) | 10.2(4.9-20.8) |
| Absolute risk reduction (%) | **-** | 13.5 | 20.1 | 10.2 | **-** | 13.1 | 14.7 | 6.9 |
| Hazard Ratio (95% CI) | - | 0.64(0.44-0.93) | 0.54(0.38-0.78) | 0.76(0.53-1.11) | **-** | 0.53(0.37-0.76) | 0.43(0.30-0.63) | 0.59(0.41-0.84) |
| Adjusted Hazard Ratio\* (95% CI) | - | 0.64(0.44-0.93) | 0.56(0.39-0.80) | 0.79(0.54-1.16) | **-** | 0.53(0.37-0.76) | 0.43(0.30-0.63) | 0.59(0.41-0.84) |
| **30 years** |  |
| No. of cases/person-years | 66/712 | 48/818 | 58/1141 | 48/673 | 60/360 | 65/716 | 54/770 | 64/647 |
| Incidence: Cases/100 person-years (95% CI) | 9.27(7.03-11.51) | 5.87(4.21-7.53) | 5.08(3.78-6.39) | 7.13(5.11-9.15) | 16.67(12.45-20.88) | 9.08(6.87-11.29) | 7.01(5.14-8.88) | 9.89(7.49-12.32) |
| Cumulative Incidence (%), (95% CI) | 96.5(72.0-99.6) | 85.1(69.4-93.1) | 81.2(69.1-89.0) | 93.2(79.1-97.9) | 96.7(84.9-99.3) | 93.4(80.7-97.8) | 84.6(70.9-92.2) | 94.9(81.1-98.7) |
| % Diabetes free (95%CI) | 3.5(0.4-28.0) | 14.9(6.9-30.6) | 18.8(11.0-30.9) | 6.8(2.1-20.9) | 3.3(0.7-15.1) | 6.6(2.2-19.3) | 15.4(7.8-29.1) | 5.1(2.3-18.9) |
| Absolute risk reduction (%) | **-** | 11.4 | 15.3 | 3.3 | **-** | 3.3 | 12.1 | 1.8 |
| Hazard Ratio (95% CI) | **-** | 0.64(0.44-0.93) | 0.54(0.38-0.78) | 0.76(0.53-1.11) | **-** | 0.57(0.40-0.81) | 0.44(0.30-0.63) | 0.60(0.42-0.86) |
| Adjusted Hazard Ratio\* (95% CI) | **-** | 0.64(0.44-0.93) | 0.56(0.39-0.80) | 0.79(0.54-1.16) | **-** | 0.57(0.40-0.81) | 0.44(0.30-0.63) | 0.60(0.42-0.86) |

Abbreviations: CI, confidence interval. \*Hazard ratio adjusted for age, BMI, and smoking.

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| **Supplemental Table 2. Thirty-year Incidence, Absolute risk reduction and Hazard ratios (HRs) of Major long-term outcomes in Control and Diet, Exercise, and Diet+Exercise intervention Groups with baseline FPG <100 or ≥100 mg/dL.** |
|  | **Baseline FPG <100 mg/dL** | **Baseline FPG ≥100 mg/dL** |
| **Control****N= 73** | **Diet****N= 69** | **Exercise****N= 83** | **D+E****N= 62** | **Control****N= 65** | **Diet****N= 79** | **Exercise****N= 72** | **D+E****N= 73** |
| **CVD events**† |  |
| No. of cases/person-years | 43/1433 | 27/1424 | 35/1676 | 27/1226 |  37/1281 | 38/1561 | 38/1366 | 30/1520 |
| Incidence: Cases/100 person-years (95% CI) | 3.00(2.10-3.90) | 1.90(1.18-2.61) | 2.09(1.40-2.78) | 2.20(1.37-3.03) | 2.89(1.96-3.82) | 2.43(1.66-3.21) | 2.78(1.90-3.67) | 1.97(1.27-2.68) |
| Cumulative Incidence (%), (95% CI) | 67.6(54.0-77.9) | 48.4(34.3-61.2) | 49.9(37.4-61.1) | 50.8(36.4-63.5) | 65.1(50.7-76.3) | 58.8(45.3-70.0) | 59.7(46.0-70.9) | 48.9(35.5-60.9) |
| % CVD event free (95%CI) | 32.4(22.1-46.0) | 51.6(38.8-65.7) | 50.1(39.9-62.6) | 49.2(36.5-43.6) | 34.9(23.7-49.3) | 41.2(30.0-54.7) | 40.3(29.1-54.0) | 51.1(39.1-64.5) |
| Absolute risk reduction (%)  | - | 19.2 | 17.7 | 16.8 | **-** | 6.3 | 5.4 | 16.2 |
| Hazard Ratio (95% CI) | - | 0.61(0.38-0.99) | 0.69(0.44-1.07) | 0.73(0.45-1.18) | **-** | 0.82(0.52-1.29) | 0.96(0.61-1.91) | 0.65(0.40-1.05) |
| Adjusted Hazard Ratio\* (95% CI) | - | 0.79(0.48-1.29) | 0.87(0.55-1.37) | 0.90(0.55-1.47) | **-** | 0.83(0.53-1.31) | 0.96(0.61-1.50 | 0.69(0.43-1.12) |
| **Microvascular disease**‡ |  |
| No. of cases/person-years | 9/1581 | 9/1544 | 18/1849 | 4/1433 |  24/1393 | 16/1690 | 14/1597 | 15/1658 |
| Incidence: Cases/100 person-years (95% CI) | 0.57(0.20-0.94) | 0.58(0.20-0.96) | 0.97(0.52-1.41) | 0.28(0.006--.55) | 1.72(1.03-2.41) | 0.95(0.48-1.41) | 0.88(0.42-1.34) | 0.90(0.45-1.36) |
| Cumulative Incidence (%) (95% CI) | 22.2(11.2-35.6) | 25.4(13.3-39.4) | 33.4(21.1-46.1) | 12.5(4.4-25.0) | 54.7(37.7-68.9) | 32.9(20.6-45.7) | 34.5(20.6-48.8) | 29.0(17.2-41.8) |
| % Microvascular disease free (95%CI) | 77.8(64.4-88.8) | 74.6(60.6-86.7) | 66.6(53.9-78.9) | 87.5(75.0-95.6) | 45.3(31.1-62.3) | 67.1(54.3-79.4) | 65.5(51.2-79.4) | 71.0(58.2-82.8) |
| Absolute risk reduction (%) | **-** | -3.2 | -11.2 | 9.7 | **-** | 23.5 | 25.1 | 19.6 |
| Hazard Ratio (95% CI) | **-** | 1.03(0.44-2.42) | 1.55(0.72-3.34) | 0.64(0.38-1.05) | **-** | 0.52(0.28-0.95) | 0.50(0.26-0.93) | 0.41(0.22-0.78) |
| Adjusted Hazard Ratio\* (95% CI) | **-** | 1.09(0.46-2.61) | 1.68(0.77-3.65) | 0.53(0.18-1.57) | **-** | 0.53(0.29-0.98) | 0.50(0.27-0.95) | 0.44(0.23-0.84) |
| **CVD deaths** § |
| No. of cases/person-years | 23/1626 | 15/1609 | 17/1954 | 14/1465 | 17/1583 | 14/1777 | 20/1686 | 9/1749 |
| Incidence: Cases/100 person-years (95% CI) | 1.41(0.84-1.99) | 0.93(0.46-1.40) | 0.87(0.45-1.28) | 0.96(0.46-1.46) | 1.09(0.57-1.62) | 0.78(0.38-1.20) | 1.19(0.67-1.71) | 0.51(0.18-0.85) |
| Cumulative Incidence (%) (95% CI) | 38.4(25.9-50.8) | 28.8(17.0-41.7) | 25.0(15.3-35.9) | 28.5(16.5-41.7) | 31.9(19.6-44.8) | 22.2(12.7-33.4) | 34.4(22.2-46.8) | 15.6(7.6-26.3) |
| % CVD death free (95%CI) | 61.6(49.2-74.1) | 71.2(58.3-83.0) | 75.0(64.1-84.7) | 71.5(58.3-83.5) | 68.1(55.2-80.4) | 77.8(66.6-87.3) | 65.6(53.2-77.8) | 84.4(73.7-92.4) |
| Absolute risk reduction (%) | - | 9.6 | 13.4 | 9.9 | **-** | 9.7 | -2.5 | 16.3 |
| Hazard Ratio (95% CI) | - | 0.63(0.33-1.21) | 0.59(0.32-1.11) | 0.64(0.33-1.24) | **-** | 0.72(0.36-1.46) | 1.10(0.57-2.09) | 0.46(0.20-1.02) |
| Adjusted Hazard Ratio \*(95% CI) | - | 0.98(0.50-1.92) | 0.80(0.42-1.52) | 0.76(0.38-1.50) | **-** | 0.74(0.36-1.50) | 1.14(0.59-2.17) | 0.51(0.23-1.14) |
| **All-cause deaths** |
| No. of cases/person-years | 40/1626 | 31/1609 | 32/1954 | 24/1465 | 36/1553 | 32/17777 | 39/1686 | 27/1749 |
| Incidence: Cases/100 person-years (95% CI) | 2.46(1.70-3.22) | 1.93(1.25-2.60) | 1.64(1.07-2.21) | 1.64(0.98-2.29) | 2.32(1.56-3.08) | 1.80(1.18-2.42) | 2.31(1.59-3.04) | 1.54(0.96-2.12) |
| Cumulative Incidence (%) (95% CI) | 55.5(43.2-66.2) | 47.9(35.1-59.5) | 42.9(31.4-53.8) | 42.6(29.4-55.2) | 57.1(43.8-68.4) | 45.0(33.1-56.4) | 55.7(43.2-60.5) | 38.5(27.1-49.8) |
| % Death free (95%CI) | 44.5(33.8-56.8) | 52.1(40.5-64.9) | 57.1(46.2-68.6) | 48.0(44.8-70.6) | 42.9(31.6-56.2) | 55.0(43.6-66.9) | 44.3(39.5-56.8) | 61.5(50.2-72.9) |
| Absolute risk reduction (%) | **-** | 7.6 | 12.6 | 3.5 | **-** | 12.1 | 1.4 | 18.6 |
| Hazard Ratio (95% CI) | **-** | 0.76(0.48-1.21) | 0.65(0.41-1.03) | 0.64(0.38-1.05) | **-** | 0.78(0.49-1.26) | 1.01(0.64-1.59) | 0.65(0.32-1.07) |
| Adjusted Hazard Ratio\* (95% CI) | **-** | 1.15(0.71-1.85) | 0.86(0.54-1.38) | 0.85(0.51-1.43) | **-** | 0.79(0.49-1.27) | 1.06(0.67-1.67) | 0.74(0.45-1.22) |

Abbreviations: CI, confidence interval. \* Hazard ratio adjusted by age, sex, and smoking.

† CVD events defined at the first occurrence of non-fatal or fatal myocardial infarction, non-fatal or fatal stroke, or sudden death, or hospitalisation for heart failure. ‡ Microvascular disease defined as the first recognition of retinopathy, nephropathy, or neuropathy. § CVD deaths are fatal CVD events.

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