Data Article

Data for serum 1,5 anhydroglucitol concentration in different populations

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Abstract

1,5 anhydroglucitol (1,5-AG), is a nonmetabolized 1-deoxy form of glucose, originate mainly from the diet. 1,5-AG is a biomarker to detect and magnify hyperglycemic excursions (postprandial hyperglycemia) in diabetic patients. Concentrations of 1,5-AG has been applied as supporting biomarker to diagnosis of the major forms of diabetes (type 1, type 2, and gestational). The serum 1,5-AG reference interval is relevant to the appropriate clinical application of this biomarker. This article contains data regards to serum concentration of the biomarker primarily for healthy subjects, capture from the literature, in different populations. Correlation analysis between 1,5-AG and markers associated with diabetes and its complication were presented. The data was complementary to the study “Reference intervals for serum 1,5-anhydroglucitol in children, adolescents, adults, and pregnant women” (Welter et al., 2018). The data present in this article improve the comparisons for 1,5-AG in different conditions and methodologies.

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Value of the data

- Data will facilitate the comparison of 1,5-AG in different studies.
- The data showed the correlation among 1,5-AG and relevant parameters associated with diabetes.
- The data provide comparison between 1,5-AG reference interval in different ethnicities, ages, gender and methodologies.
- These data provide information to researchers and clinical laboratory professionals to improve the 1,5-AG diagnostic use.

1. Data

In this article, we provide complementary data (urea, total protein and lipid profile) of the studied groups (Table 1), correlation analysis (Table 2) and comparisons from the literature for serum 1,5-anhydroglucitol (1,5-AG) concentration, to our study. We proposed a reference interval (Tables 3 and 4) for this biomarker in children, adolescent, adults and pregnant women [2].

Table 1
Complementary laboratory characteristic of studied groups.

| Parameters     | Children n = 580 | Adolescents n = 496 | Adults n = 922 | Pregnant women n = 305 |
|----------------|------------------|--------------------|---------------|----------------------|
| Sex (M/F)      | 242/338          | 192/304            | 460/462       | –                    |
| Urea, mmol/L   | 3.8 (3.1–4.5)    | 3.8 (3.2–4.3)      | 4.3 (3.5–5.3) | 3.4 (2.8–4.3)        |
| Total Protein, g/L | 81 (74–89)      | 78 (71–85)         | 71 (67–74)    | 69 (64–74)           |
| Cholesterol, mmol/L | 4.1 (3.6–4.6)  | 3.9 (3.4–4.4)      | 4.4 (4.0–5.4) | 5.2 (4.1–6.2)        |
| HDL-c, mmol/L  | 1.4 (1.2–1.6)    | 1.3 (1.0–1.5)      | 1.4 (1.1–1.5) | 1.2 (1.0–1.6)        |
| LDL-c, mmol/L  | 2.1 (1.7–2.5)    | 2.1 (1.7–2.6)      | 2.5 (2.0–3.1) | 3.0 (2.5–4.1)        |
| Triglycerides, mmol/L | 1.1 (0.8–1.5) | 0.8 (0.6–1.1)     | 1.4 (1.0–2.0) | 1.3 (1.0–2.0)        |

Values are median (25–75%; interquartile range); M, male and F, female
HDL-c, high density lipoprotein-cholesterol; LDL-c, low density lipoprotein-cholesterol
Abbreviations: BMI, Body mass index; n, sample size.
We studied healthy Euro-Brazilian subjects, classified as children (0–14 years old), adolescent (14–18 years old) and adults (≥ 18 years old). Additionally, we analyzed pregnant women in four gestational periods, 0–23 weeks; 24–28 weeks, 29–32 weeks and >32 weeks of gestation. 1,5-AG was measure by enzymatic colorimetric method (Glycomark™; Tomen America, New York, NY, USA) in automated system Labmax 400 analyzer (Labtest Diagnostic).

The laboratory parameters, markers for kidney function (urea), nourishment (total protein) and lipid profile were compatible with healthy subjects (Table 1).

The correlation in healthy subjects between 1,5-AG and glycemia, HbA1c, age, BMI and creatinine were weak or none (Table 2).

2. Experimental design, materials and methods

2.1. Study population

The population comprises 2303 unrelated Euro-Brazilian healthy subjects from Curitiba, State of Parana, South of Brazil [1]. All samples were obtained with the approval of the Ethics Committee of the Federal University of Parana.

Adult samples (n = 922) were collected from blood bank donors. Children (n = 580) and adolescent samples (n = 496) were obtained from Public Schools. Healthy pregnant women (n = 305) samples were obtained from the Curitiba Government Laboratory.

The normoglycemic criteria applied for selected subjects in the study were fasting glycemia <5.5 mmol/L with an HbA1c range of 20.2–36.6 mmol/mol (4.0–5.7%) for children, adolescents, and adults. For pregnant women a fasting blood glucose <5.1 mmol/L was applied to exclude gestational diabetes.

All subjects declared that were not using any medications or drugs.

2.2. Samples

Samples were serum obtained in non-fasting state for adults, children and adolescents, and fasting for those who were pregnant. Blood were collected in BD vacutainers SST II advance vacutainer with

Table 2
Significant (P < 0.05) Spearman rank order correlation of 1,5 anhydroglucitol with glycemia, HbA1c, age, body mass index (BMI) and creatinine.

| Groups        | Sex  | 1,5-AG correlation (R) | Glycemia | HbA1c | Age  | BMI | Creatinine |
|---------------|------|------------------------|----------|-------|------|-----|-----------|
| Children (0–14 y) | Male | NS                     | NS       | 0.133 | NS   | NS  | NS        |
|               | Female | NS                    | NS       | 0.128 | NS   | NS  | 0.163     |
| Adolescents (14–18 y) | Male | NS                    | 0.221    | 0.153 | 0.151 | NS  |           |
|               | Female | NS                    | NS       | 0.221 | NS   | NS  |           |
| Adults (≥ 18 y) | Male | NS                    | NS       | −0.144| NS   | NS  |           |
|               | Female | NS                    | NS       | −0.102| NS   | NS  |           |
| Combining all |      | NS                    | NS       | −0.310| −0.187| 0.112|           |

Pregnant women

| Gestation weeks | n = 110 | n = 106 | n = 52 | n = 37 | Combining pregnant |
|-----------------|---------|---------|--------|--------|--------------------|
| <23 weeks       | NS      | NS      | NS     | NS     | 0.095              |
| 24–28 weeks     | NS      | NS      | NS     | NS     | −0.155             |
| 29–32 weeks     | NS      | NS      | NS     | NS     | 0.402              |
| >32 weeks       | NS      | NS      | NS     | NS     |                   |

NS, non-significant; –, data no available.
Y, years old.
Table 3
Serum 1,5-anhydroglucitol reference intervals and concentrations in different healthy populations.

| Sex                              | 1,5-AG, μmol/L | Studies/Methodology                      |
|----------------------------------|----------------|------------------------------------------|
| Subjects                         | Male           | Female                                   |
|                                  | R.I. n         | R.I. n                                   |
| Children and adolescents (5–18 years) | (92–298) 432  | (84–278) 642                              |
| US adolescents (12–18 years)     | (95–178) 6     | (140–172) 5                               |
|                                  | (95–178) [88–212] 150 ± 31 | (120–180) 150 ± 15 |
|                                  | [102–198]      |                                          |
|                                  | 150 ± 24       |                                          |
| US young                         | 158 ± 40 82    | 143 ± 37 54                              |
| (10–29 years)                    | (63–271) [78–238] | (54–227) [69–217] |
| Adult (19–79 years)              | (80–260) 460   | 62–241 462                                |
| Finland adults (25–50 years)     | 93 mean 29     | 77 mean 110                               |
|                                  | 81 mean; 10–146 range (n = 139) |                                          |
| US adults (18–39 years)          | (61–207) 224   | (37–195) 224                              |
| US adults (18–39 years)          | (52–178) 875   | (50–166) 924                              |
| Australian adults (40 ± 13 years)| 125 ± 41 (n = 95) |                                          |
|                                  | [43–207]       |                                          |
| Chinese adults (22–80 years)     | 182 ± 39       | 159 ± 52                                  |
|                                  | [104–260]      | [55–263]                                  |
| Chinese adults > 20 and < 40 years > 50 years | 176 ± 46 [84–268] | 116 ± 35 [46–186] 185 |
|                                  | 166 ± 67 [32–300] 9 | 122 ± 41 [40–204] 14 |
| Chinese adults                   | 161.9 ± 40.2 [81.5–242.3] (n = 120) | |
| Region                      | Min-Max (n) | Mean ± SD (Median, IQR) | Sample Size | Method                          |
|-----------------------------|-------------|-------------------------|-------------|---------------------------------|
| Chinese adults (22–78 years)| 190 ± 54 [82–298] (69–278) [67–279] | 173 ± 53 [79–306] 175.2 ± 55.8 [63.6–286.8] | 254 226 | Enzymatic colorimetric GlycoMark™ ([14]) |
| Chinese adults (20–79 years)| (107–367) 226.3 ± 60.7 [104.9–347.7] | 232 | Enzymatic Medical system, Ningbo, China ([15]) |
| Japanese (18–81 years)      | 132 ± 36 (n = 45) [60–204] | | | Gas–liquid chromatography (GLC) ([16]) |
| Japanese (mean 47 years)    | 145 ± 44 (n = 229) [57–233] | | | Gas–liquid chromatography (GLC) ([17]) |
| Japanese (27–68 years)      | (114–215) 158 ± 38 [82–234] | | | Gas–liquid chromatography (GLC) ([18]) |
| Japanese adults (23–76 years)| 159.8 ± 9.8 (n = 20) [140–179] | | | Enzymatic Nippon–Kayaku ([19]) |
| Japanese adults (30–79 years)| 140 ± 56 [28–252] | 122 ± 43 [36–208] | 991 1104 | Enzymatic Kyowa Medex Co. ([20]) |
| Japanese adults             | 137.1 ± 8.2 [120.7–153.5] (50.5 ± 9.7 y) 124.3 ± 45.1 [34.1–214.5] (74.5 ± 5.8 y) | 120.6 ± 39 [42.6–198.6] (54.1 ± 10.3) 115.1 ± 40.2 [34.7–195.5] (75.3 ± 6.7 y) | 181 231 | Enzymatic Lana Nippon–Kayaku ([21]) |

US, Americans from United States; UK, English; n, sample size.
Values were reference interval (2.5th–97.5th); [95% calculated as mean ± 2–SD]; mean ± SD or median (IQR, interquartile range, 25–75%).
Table 4
Serum 1,5-anhydroglucitol reference intervals and concentrations in pregnancy in different populations.

| Pregnant                          | 1,5-AG, μmol/L R.I. | n   | Studies/Methodology                                      |
|----------------------------------|---------------------|-----|---------------------------------------------------------|
| Pregnant Women < 23 weeks of gestation | (56–298)           | 110 | Our study [2] Enzymatic colorimetric GlycoMark™         |
| Pregnant Women > 24 weeks of gestation | (33–181)           | 195 | Our study [2] Enzymatic colorimetric GlycoMark™         |
| Japanese healthy non-pregnant women | 113 ± 32            | 25  | [22] Gas-liquid chromatography (GLC)                     |
| Japan pregnant women at 36 weeks gestation | 62 ± 28            | 543 |                                                          |
| Japan women on 5th day of puerperium | 66 ± 23            | 543 |                                                          |
| Japan women on 30th day of puerperium | 87 ± 21            | 543 |                                                          |
| Japan pregnant Women at > 24 weeks of gestation | 128 (IQR 102–160) |     |                                                          |
| UK Normoglycemic women with glycosuric pregnancy (~31 weeks) | 46 (IQR 30–56)   | 16  | [23] High-performance liquid chromatography (HPLC)       |
| UK Normoglycemic women without glycosuric pregnancy (~31 weeks) | 72 (IQR 55–79)   | 16  |                                                          |
| UK Normoglycemic women (~31 weeks) | 55 (IQR 31–72)    | 32  |                                                          |
| Chinese pregnant women (16–45 years) at 26–28 weeks of gestation | 133.0 ± 52.9       | 44  | [24] Enzymatic pyranose oxidase                         |

US, Americans from United States; UK, English; n, sample size.
Values were reference interval (2.5th–97.5th); [95% calculated as mean ± 2 – SD]; mean ± SD or median (IQR, interquartile range, 25–75%).
silica clot activator/gel (Becton Dickinson Co.). Bloods were separated in less than two hours from venipuncture and the serum stored in an ultrafreezer (−80 °C).

2.3. Analytical methods

Concentrations of 1,5-AG were measured enzymatically with the Glycomark reagent (GlycoMark, Tomen America, New York, NY Inc.) in an automated system (Labmax 400 analyzer; Labtest. Diagnostics). The reaction details and methodology performance were described in Nowatzke et al. [6].

2.4. Clinical and laboratory parameters

Clinical data acquisition and analytical procedures, for laboratory data, have been reported previously [2].

2.5. Data analysis

Descriptive statistics, correlation analysis and reference intervals were calculated with MedCalc MedCalc version 17.6 (MedCalc Statistical Software bvba, Ostend, Belgium). Probability values (p-values) less than 5% (p < 0.05) were considered significant for all tests.

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Transparency document. Supporting information

Transparency data associated with this article can be found in the online version at http://dx.doi.org/10.1016/j.dib.2018.08.165.

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