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Probiotics and synbiotics for glycemic control in diabetes: A systematic review and meta-analysis of randomized controlled trials

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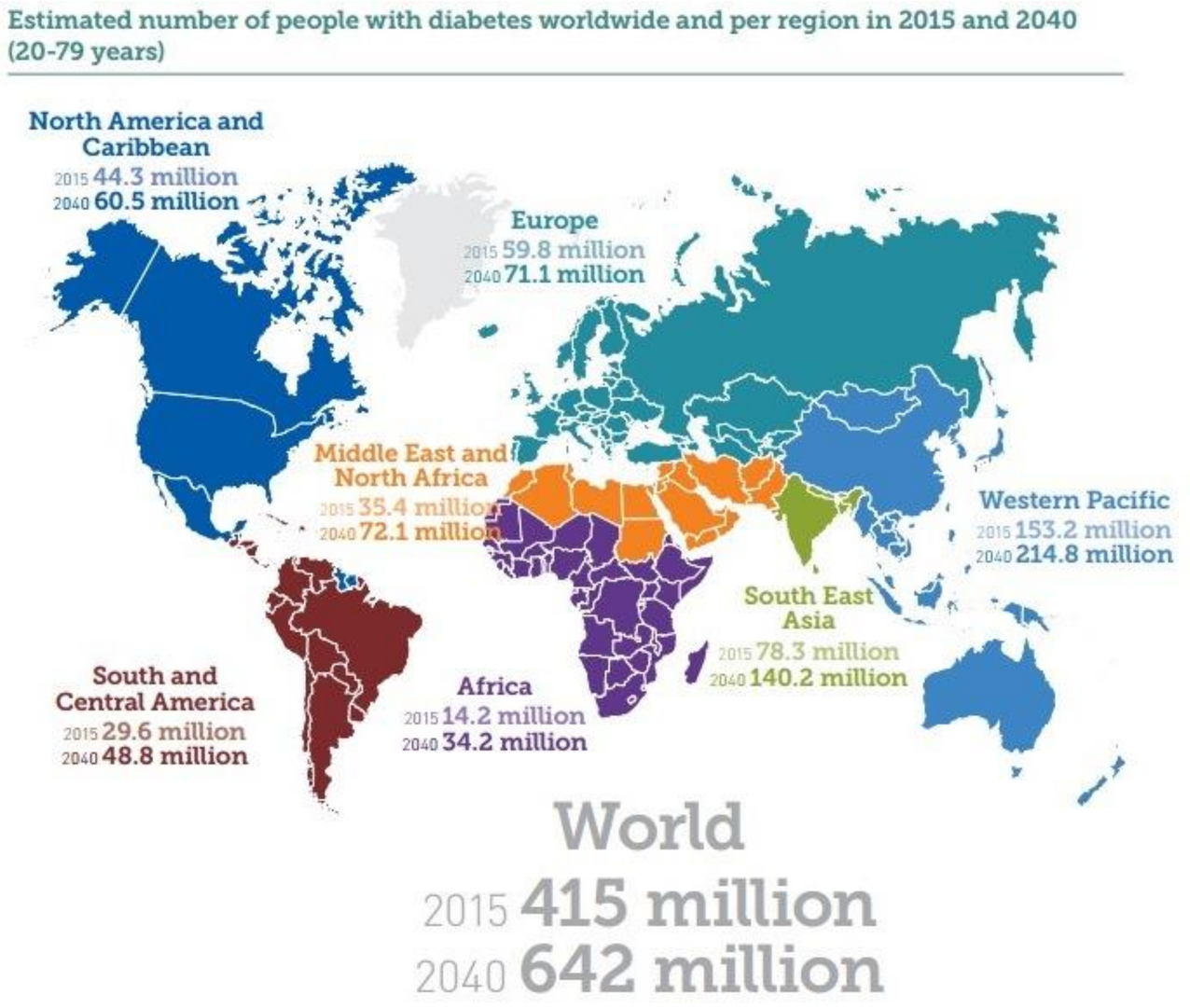
Diabetes mellitus is a **global health challenge**, with a significant rise in both Type 1 Diabetes Mellitus (T1DM) and Type 2 Diabetes Mellitus (T2DM) cases.

Diabetes leads to serious health complications contributing to **high morbidity and mortality rates**.
Today maintaining optimal **glycemic control remains challenging** for many patients and there is a growing interest in alternative and **complementary therapies**



Emerging evidence suggests the **gut microbiome and probiotics** play a crucial role in metabolic health, influencing insulin sensitivity and inflammation.

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The **gut microbiome** has increasingly been recognized for its **pivotal role in metabolic health**

COMPLEMENTARY THERAPIES

Probiotics are live microorganisms that confer health benefits to the host when administered in adequate amounts.

Synbiotics are combinations of probiotics and prebiotics that improve the survival and colonization of beneficial bacteria in the gut.

WHAT WE KNOW

Probiotics and synbiotics **may improve glycemic control** by modulating gut microbiota, enhancing insulin sensitivity, reducing systemic inflammation, and improving lipid metabolism.

MAIN AIM

To assess the efficacy of probiotics and synbiotics in improving glycemic control among adults with T1DM and T2DM.

METHODS

PICOS

Population: adults with T1DM or T2DM
Intervention: administration of probiotics or synbiotics.
Comparison: Placebo or no intervention.
Outcomes: changes in HbA1c levels and in fasting plasma glucose (FPG) and insulin levels.
Study Design: only Randomized Controlled Trials (RCTs) were included to ensure high-quality evidence.

5 DATABASE USED

DATA EXTRACTION

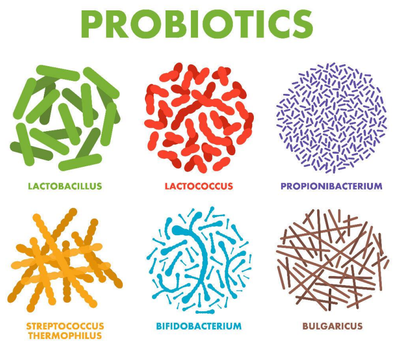
Study characteristics: author, year, country, sample size.
Participant characteristics: age, gender, type of diabetes
Intervention details: type, dosage, duration of probiotic/synbiotic use.
Outcomes: baseline and follow-up values for HbA1c, FPG, and insulin levels (preferably 12 weeks)

The **Cochrane Risk of Bias tool 2.0** (RoB2) was employed to assess the risk of bias in the included studies

RESULTS

OVERWIEW

- **Records Identified:** 537
- **Records Included:** 41 RCTs
- **Total Participants:** 2991 (54% females)
- Majority of the studies were conducted in **Iran**



INTERVENTIONS

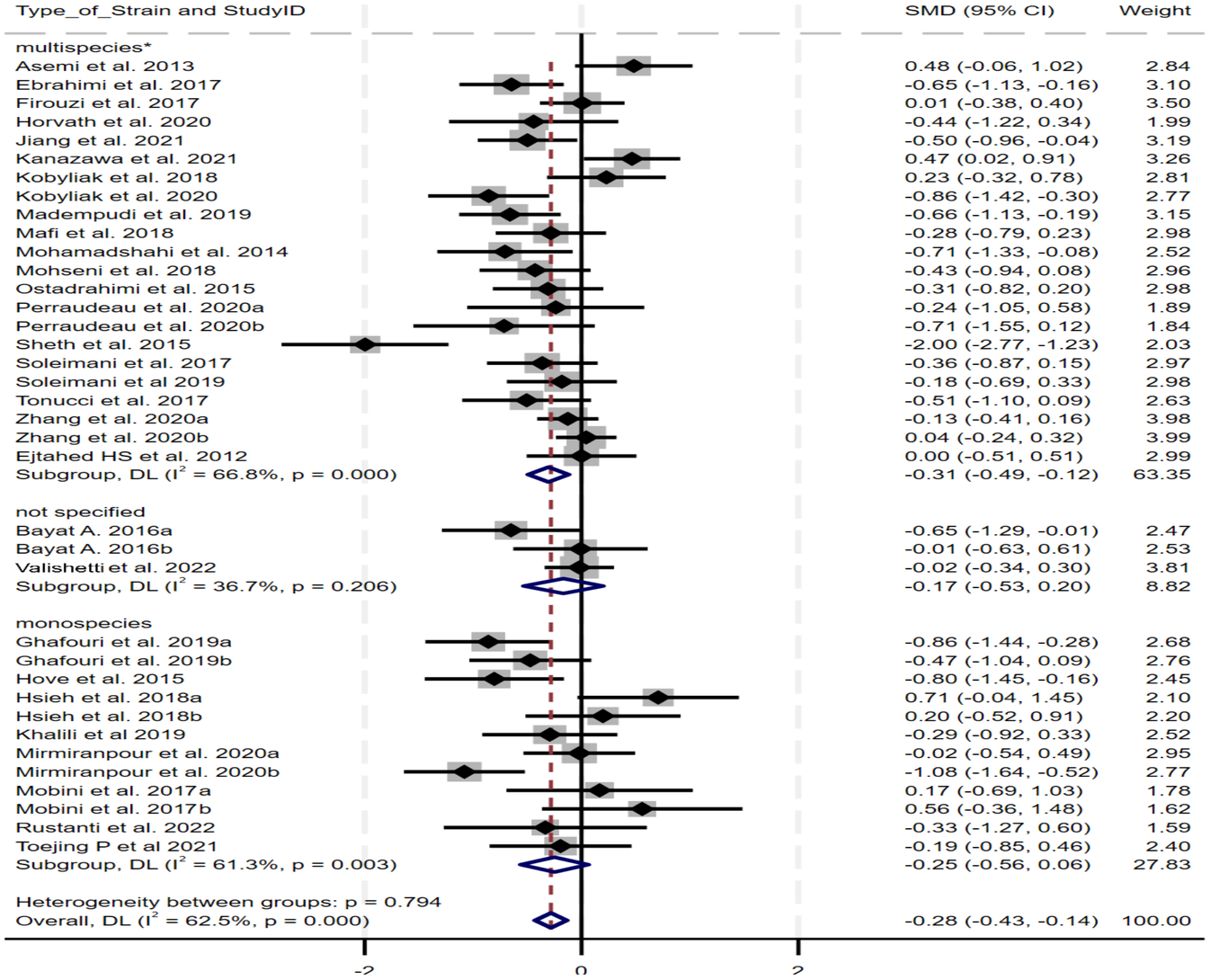
- **Probiotic Capsules**
- **Synbiotic Bread**
- **Probiotic Honey**
- **Fermented Milk**

PLACEBO

- **Placebo Capsules**
- **Control Bread**
- **Stadard Honey**
- **Non-Fermented Milk**

EFFICACY OF PROBIOTIC/SYNBIOTICS ON HbA1C

Probiotic supplementation showed a **significant reduction in HbA1c** levels in the treated groups compared with the control groups. This indicates an improvement in long-term glycemic control.



The heterogeneity in the results suggests that the efficacy **may vary** depending on multiple factors, such as the type of diabetes and the specific strains of probiotics or synbiotics used.

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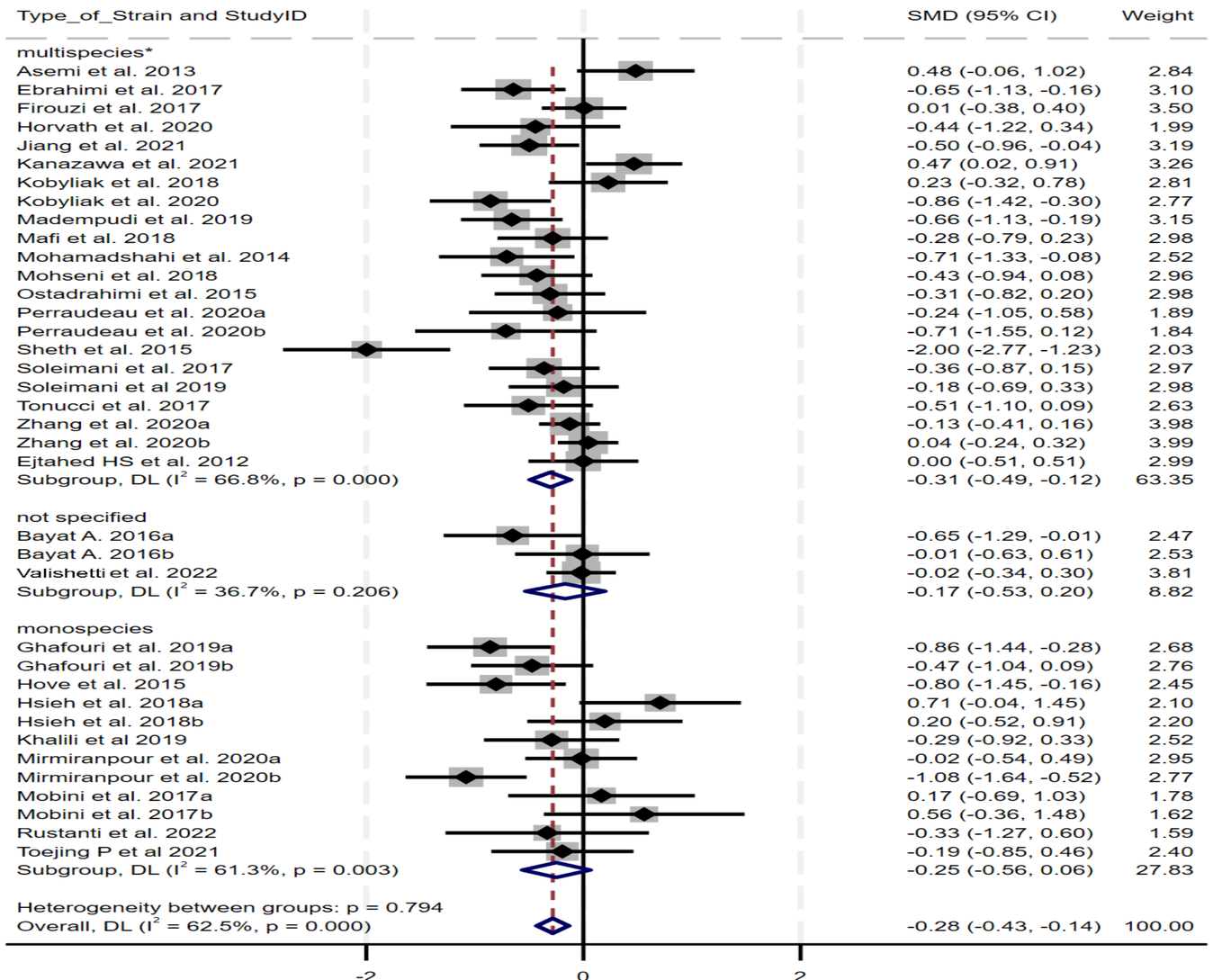
EFFICACY OF PROBIOTIC/SYNBIOTICS ON FPG

Some studies have reported a **significant reduction in FPG** levels in probiotic-treated groups compared with control groups.



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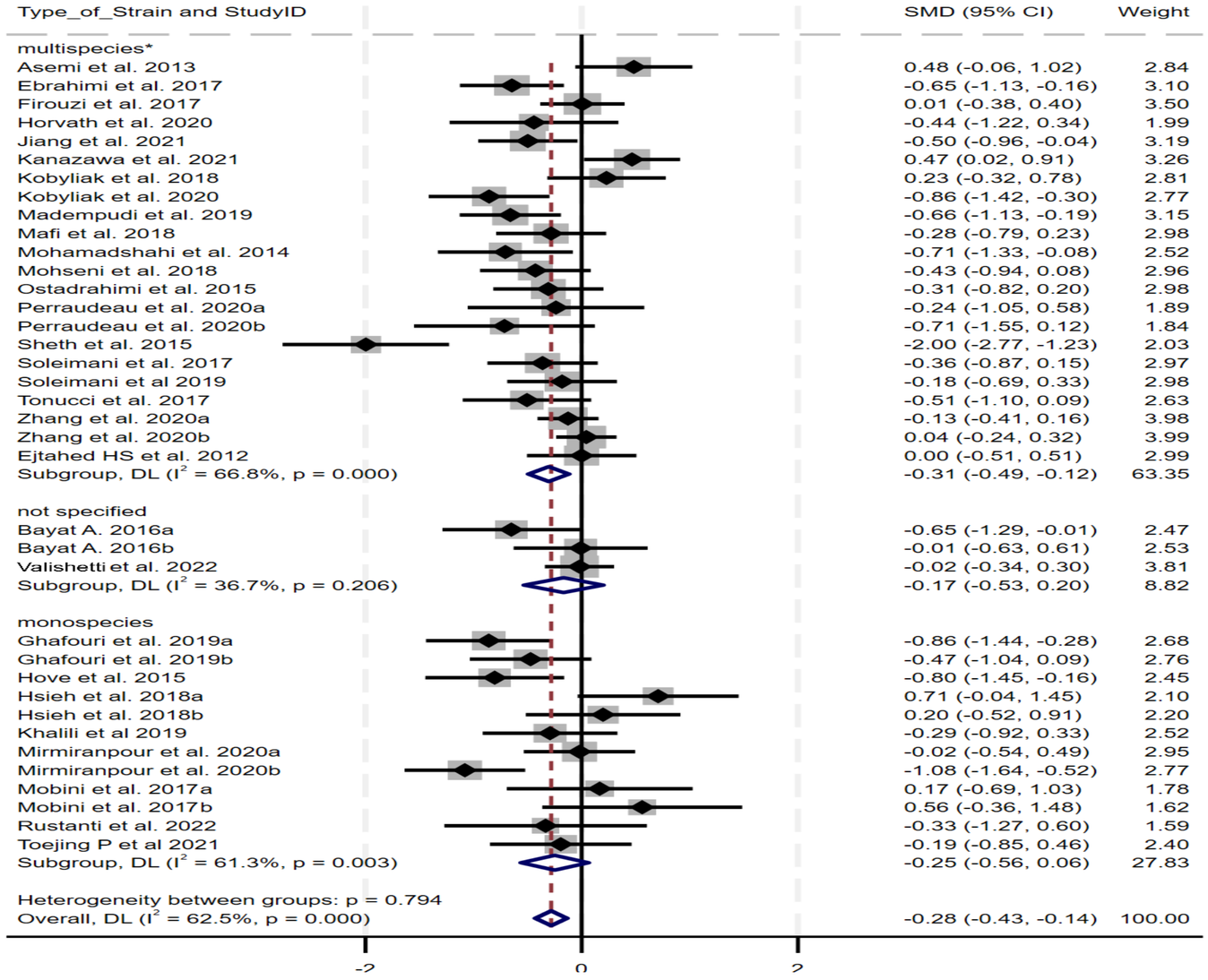
EFFICACY OF PROBIOTIC/SYNBIOTICS ON INSULIN

Some studies have observed a **significant decrease** in fasting insulin levels and insulin resistance in probiotic-treated groups.



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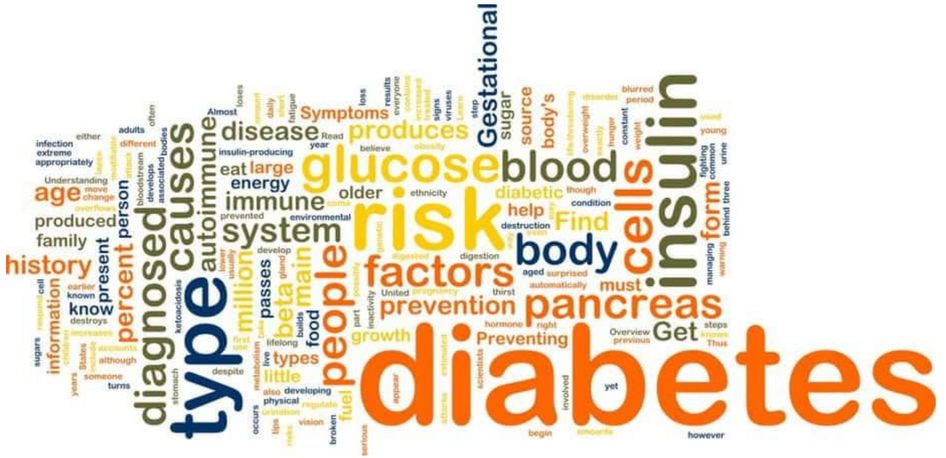
LIMITS

1. **Heterogenity across the included studies**
2. **Geografic bias**
3. **Not consistely reported baseline Hb1AC**
4. **Not difference between TDM1 and TDM2**
5. **Omission of several potential confounding variables**
6. **Prevalence of adult population**

CONSIDERATIONS FOR FUTURE RESEARCH

1. Vast geographic representation
2. More consistent baseline details
3. Distinction between diabetes types
4. Control for confounding variables



THANK YOU SO MUCH !