



Introduction

Microplastics, defined as plastic particles smaller than 5mm, originate from various consumer products and industrial processes. Alarmingly pervasive, they are found in numerous sources including plastic bottles, food packaging, synthetic clothing, and personal care products. Exposure during this critical time of pregnancy can adversely affect maternal and fetal health, with potential impacts on pregnancy outcomes such as Gestational Diabetes Mellitus(GDM) and hypothyroidism

Objectives

- To screen pregnant women with microplastic exposure from enrolment data of the study population using an epidemiological survey questionnaire and a microplastic impact questionnaire.
- To correlate the prevalence of gestational diabetes mellitus (GDM) and hypothyroidism with the levels of microplastic exposure in the study group.

Methodology

Study design: Prospective cohort study
Participants: The study population was composed of 639 pregnant women recruited from antenatal visits at SRM Medical College Hospital and Research Centre, Kattankulathur, between March 2023 to March 2024.
Data collection: Microplastic Exposure Questionnaire (Demographic factors, Dietary habits, Use of toiletries)
Exposure categories: Participants were classified into three categories - low, moderate, and high based on their responses to the Microplastics Exposure questionnaire. Cut-off values were established using data from the statistical analysis of questionnaire scores as follows, low exposure (score <83), moderate exposure (score between 83 and 106), and high exposure (score > 106).
Quantification of microplastic exposure:
 The total microplastic exposure for each participant was calculated by summing the estimated exposure from all items used,

$$\text{Total Microplastic Exposure (g)} = \sum (\text{Estimated Microplastic Content (g)} \times \text{Frequency} \times \text{Duration})$$

Outcome Assessment:

The primary outcomes assessed were the incidence of GDM and hypothyroidism. GDM was diagnosed using the results of a 2-hour 75g OGTT conducted between 24 and 28 weeks of gestation, following the criteria established by the IADPSG. Hypothyroidism was determined through thyroid function tests, including the assessment of TSH and fT4, using reference ranges and clinical guidelines.

Results

Incidence of GDM:

Out of the 639 participants, 153 (24.32%) were diagnosed with GDM, while 476 (75.68%) remaining were non-GDM.

Levels of exposure during pregnancy:

Level of microplastic exposure	Frequency(n)	Percentage (%)
Low	177	27.7
Moderate	296	46.3
High	166	26.0
Total	639	100

Correlation between microplastics exposure and GDM

Independent variable	Dependant variable	N	Correlation coefficient	P value
Microplastic exposure	GDM	629	+0.138	<0.001

Correlation between microplastic exposure and hypothyroidism

Independent variable	Dependant variable	N	Correlation coefficient	P value
Microplastic exposure	Hypothyroidism	579	-0.003	0.940

Highlights:

- 1.This study establishes a significant association between maternal microplastic exposure and the incidence of Gestational Diabetes Mellitus, identifying microplastics as a potential novel risk factor for this pregnancy complication.
- 2.Utilizing a validated Microplastic Exposure Questionnaire, the research provides a comprehensive assessment of exposure from various sources, including dietary intake and use of personal care products enhancing the reliability of the findings.

Conclusion

The analysis of the levels of microplastic exposure and its association with the incidence of GDM highlights the importance of understanding the impact of environmental exposure on maternal and fetal health.

References:

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Competing Interest: NIL

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