Original Article

Awareness of Microplastics and its Association with Sociodemographic Determinants among Medical Students in South India - A Cross-Sectional Study

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Abstract

Background: Global public health is seriously threatened by microplastic contamination, with the majority of microplastics coming from human activity. Therefore, raising public awareness will be the most effective way to decrease microplastic contamination. The purpose of this study is to evaluate the awareness of microplastics and their association among the medical students in a tertiary care teaching institute in Kulasekharam, Tamil Nadu. **Material and Methods:** A cross-sectional study was conducted among medical students at a tertiary care teaching institute in Kulasekharam, Tamil Nadu, from November 2025 to January 2026. A simple random sampling technique was used to choose 370 participants. A semi-structured questionnaire was used to collect knowledge, attitude and awareness variables on microplastics. The data were analysed using SPSS version 26 software. Frequencies, mean, standard deviation and proportions were calculated. The chi-square test was used to find the association between variables, and a p-value < 0.05 was considered statistically significant. **Results:** This research had 370 students in total. The participants' mean age (standard deviation) was 20.81 (1.846) years. Awareness of microplastics was statistically significantly predicted by variables such as age above 20 years (OR=2.414; 95%CI: 1.564 – 3.727; p < 0.001), female gender (OR=1.942; 95%CI: 1.251 – 3.012; p = 0.003), and clinical year of study (OR=1.804; 95%CI: 1.173 – 2.774; p = 0.007). **Conclusion:** Awareness of microplastics is influenced by gender and educational level. Integrating environmental health topics into medical education is recommended.

Keywords: Microplastics, Awareness, Medical students, Environmental health, Cross-sectional study.

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Introduction

Plastic particles 5 mm or smaller that are categorised as primary or secondary based on their origin are referred to as "microplastics".[1] There are two types of microplastics: primary and secondary. Primary microplastics, such as industrial abrasives used in sandblasting and microbeads used in cosmetics, are specially produced within the microplastic range. When larger plastic objects break apart or weather due to wear, or are released into the environment, secondary microplastics are produced.[2]

The industrial production of plastic-based or plastic-containing products, the release of synthetic fibers and particles into water during the washing of synthetic clothing, mechanical factors like friction, impact, disintegration, and improper disposal, and degradation processes like biodegradation, photodegradation, thermal, and thermo-oxidative degradation are some of the ways that microplastics can enter the environment.[3]

Human exposure to nano and microplastics is widely recognised as occurring predominantly through diet or inhalation.[4] Diet is the primary cause of exposure. Dust, dirt, textiles, industries, and general garbage are mentioned in other sources. Humanity absorbs microplastics through seafood, sea salt, processed food and beverages.[5]

Microplastics have a variety of negative impacts, such as oxidative damage, growth retardation, and harm to the body and brain.[6] The authorities have concentrated their attention on this issue in the past several years due to the evidence of detrimental effects of microplastic exposure on human and environmental health.[7]

Marine pollution control and management plans are part of the 2030 Agenda for Sustainable Development, which was endorsed by the UN on September 15, 2015, to significantly reduce it by 2025.[8] Understanding how microplastics affect people's health is essential, especially for medical students who will eventually work in the medical field and be responsible for educating

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patients about health. Studies evaluating people's knowledge of microplastics are scarce in India, nonetheless. Thus, the purpose of this study was to assess medical students' knowledge and awareness of microplastics and investigate their relationship to sociodemographic characteristics at a tertiary care teaching institute in Kulasekharam, Tamil Nadu.

Materials and Methods

Medical students from a tertiary care teaching institution in Kulasekharam, Tamil Nadu, participated in this cross-sectional study from November 2025 to January 2026. The study was approved by the Institutional Human Ethics Committee before its commencement. Undergraduate MBBS Medical students from the 1st year to CRMI (Compulsory Rotatory Medical Internship) were included.

The sample size was calculated, considering that the proportion of university students who had heard of microplastics was 75%, as per the study by Cammalleri.[1] The formula n=Z 2pq/d2 [z =1.96, p=60.9, q=39.1(100-60.9), d=5] was used to determine the sample size with a 95% confidence range and a 5% allowed error. With a 25% non-response rate, the computed sample size was 288; the total sample size for this study was 370.

Participants were chosen using a simple random sampling technique. A Google Forms-created questionnaire was used to evaluate the goal, and it was sent to the participants via Instagram and WhatsApp. Data were gathered using a pre-tested, six-section semi-structured questionnaire.

Section 1 included questions related to the sociodemographic details of the participants, such as age, gender, year of study, and place of residence. Section 2 assessed awareness regarding microplastics, and only those participants who responded "yes" were directed to answer the subsequent sections of the questionnaire. Section 3 focused on knowledge assessment and comprised eight questions. Among these, six questions assessed knowledge of the definition and environmental risks, with a score of 1 awarded for correct answers and 0 for incorrect answers. For questions related to sources, information, and overall knowledge, participants who correctly identified three or more sources were given a score of 2, while others were given a score of 1. Similarly, for industry-related information, participants who correctly identified four or more industries were awarded a score of 2, while others received a score of

1. The maximum possible knowledge score was 14. Section 4 included questions related to the health impacts of microplastics. Section 5 consisted of five questions assessing participants' attitudes towards microplastics, and Section 6 included ten questions evaluating the practices adopted by individuals in their daily lives to reduce exposure to microplastics.

Statistical analysis: Microsoft Excel was used to enter the data, while SPSS version 26 was used for analysis. Frequencies, means, standard deviations, and proportions were used in the analysis of the descriptive data. Predictors were found using the chi-square test, and the degree of relationships was assessed using odds ratios with 95% confidence intervals. A statistically significant p-value was less than 0.05.

Results

A total of 370 students were included in this study. The mean age (Standard Deviation) of the participants was 20.81(1.846) years. The majority of students, 237(64.1%), were female, and 133(35.9%) were male. Around 227(61.4%) of the students who participated belonged to an urban area, and 143(38.6%) belonged to a rural area. The majority were in an internship, 82 (22.2%). [Table 1] More than half of the participants, 237 (64.1%), were aware of microplastics. [Figure 1]

Among the 237 participants who were aware of microplastics, only 185 (78.1%) correctly answered the definition of microplastics. The majority were aware that the major source of microplastics is seafood (139,58.6%), and the source of information is social media (130, 54.9%) and the internet (100, 42.2%). Plastic water bottles and plastic food packages 137(57.8%), followed by cosmetics (69, 29.1%), were the predominant causes of microplastics. Around 190(80.2%) participants answered that microplastics pose an environmental risk. Overall knowledge was answered with a score of 3 (average) as 79(33.3%). [Table 2] Around half of the participants, 116 (48.9%), had good knowledge about microplastics. [Figure 2]

Almost more than 90% of the participants had a positive attitude towards microplastics, such as adopting lifestyle changes, awareness, and the use of eco-friendly products to reduce microplastic pollution. [Figure 3] The overall general preventive practices towards microplastics were high (more than 70%), and the specific behaviour of avoiding seafood showed relatively lower compliance (45.6%). [Table 3] The odds of being aware of microplastics were 2.4 times higher (OR=2.414; 95%CI: 1.564 – 3.727; $p < 0.001$) for participants over the age of 20. The odds of being aware were 1.94 times (OR=1.942; 95%CI: 1.251 – 3.012; $p = 0.003$) greater for female individuals than for male participants. Compared to first- and second-year students (preclinical years), third-year, final-year, and CRMI (clinical years) students had 1.8 times (OR=1.804; 95%CI: 1.173 – 2.774; $p = 0.007$) higher chances of awareness. Awareness of microplastics was statistically significantly predicted by factors like age above 20, female gender, and clinical year of research. [Table 4]

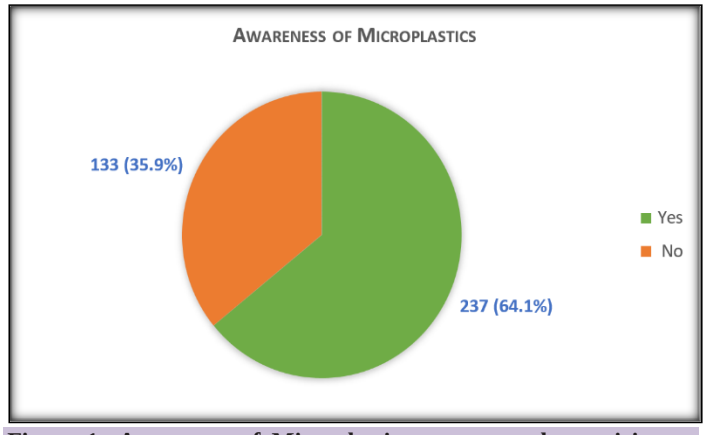

Figure 1: Awareness of Microplastics among study participants (n=370).

Table 1: Socio-demographic characteristics of study participants (n=370)

Basic details of the participants		Frequency (n)	Percentage (%)
Place of residence	Urban	227	61.4
	Rural	143	38.6
Age (in years)	≤20	163	44.1
	>20	207	55.9
Sex	Male	133	35.9
	Female	237	64.1
Year of the present study	First-year	77	20.8
	Second-year	78	21.1
	Final year (part-I)	73	19.7
	Final year (Part-II)	60	16.2
	CRMI (Internship)	82	22.2

#Multiple response

Table 2: Knowledge about Microplastics among the study participants (n=237)

Knowledge about Microplastics		Frequency (n)	Percentage (%)
Define Microplastics	Microscopical nylon threads that does not threaten the environment	11	4.6
	Soft polymers of various shapes that dissolve in water	22	9.3
	Synthetic polymers used in cosmetic products	19	8
	Tiny pellets made of plastics and small pieces formed during breakdown of plastics, and that they might be a danger to the natural environment	185	78.1
Awareness on where Microplastics can be found in#	Air	64	27
	Drinking water	132	55.7
	Food (seafood)	139	58.6
	Human tissues	43	18.1
	I don't know	55	23.2
Sources of Information#	Social media	130	54.9
	Internet	100	42.2
	Education	60	25.3
	Television	45	19
	Books	30	12.7
	Radio/FM	20	8.4
Microplastics found in Industries#	Plastic water bottles and plastic food packaging	137	57.8
	Cosmetics	69	29.1
	Car tyres	66	27.8
	Clothing	56	23.6
	Paint	63	26.6
	Aquaculture & Fishing	60	25.3
	Do not know	28	11.8
Ever searched for information	Never	151	63.7
	Sometimes	85	35.9
	Frequently	1	0.4
Ever discussed about microplastics#	Never	150	63.3
	Family members and relatives	37	15.6
	Friends	36	15.1
	Health worker	29	12.2
Environmental risk	Yes	190	80.2
	No	8	3.4
	Not sure	39	16.4
Overall rating of Knowledge (subjective)	Score 1	56	23.6
	Score 2	77	32.5
	Score 3	79	33.3
	Score 4	21	5.7
	Score 5	4	1.7

#Multiple response

Table 3: Practice of individuals to reduce their exposure to Microplastics in daily life (n=237)

Practices to reduce the exposure of Microplastics	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)
Avoid drinking water in plastic bottles	113 (47.7%)	102 (43%)	22 (9.3%)	-	-
Avoid heating foods in plastic packages	134 (56.5%)	90 (38%)	13 (5.5%)	-	-
Wearing clothes made of natural fibres	89 (37.5%)	94 (39.7%)	40 (16.9%)	10 (4.2%)	4 (1.7%)
Using reusable baby pampers	76 (32.1%)	91 (38.4%)	53 (22.4%)	14 (5.9%)	3 (1.3%)
Using reusable feminine hygiene pads	81 (34%)	92 (38.8%)	52 (21.9%)	9 (3.8%)	3 (1.3%)
Avoid body care / cosmetic products containing microplastics	97 (40.9%)	100 (42.2%)	37 (15.6%)	3 (1.3%)	-
Sorting plastic wastes, not polluting nature	131 (55.3%)	84 (35.4%)	21 (8.9%)	1 (0.4%)	-

Preferring ecologic journeys (bus, train)	89 (37.5%)	104 (43.9%)	40 (16.9%)	2 (0.8%)	2 (0.8%)
Cleaning dusts from all surfaces frequently	86 (36.3%)	100 (42.2%)	49 (20.7%)	1 (0.4%)	1 (0.4%)
Avoid seafood	53 (22.4%)	55 (23.2%)	85 (35.9%)	26 (11%)	18 (7.6%)

n (%): Frequency (Percentage)

Table 4: Association between awareness of Microplastics and basic characteristics of the participants (n=237)

Characteristics of participants		Awareness of Microplastics		OR (95% CI)	p-value
		Yes n (%)	No n (%)		
Place of residence	Urban	152 (67%)	75 (33%)	1.383 (0.896-2.133)	0.142
	Rural	85 (59.4%)	58 (40.6%)		
Age (in years)	>20	151 (72.9%)	56 (27.1%)	2.414 (1.564-3.727)	<0.001*
	≤20	86 (52.8%)	77 (47.2%)		
Sex	Female	165 (69.6%)	72 (30.4%)	1.942 (1.251-3.012)	0.003*
	Male	72 (54.1%)	61 (45.9%)		
Year of the present study	Third year, Final year, CRMI	150 (69.8%)	65 (30.2%)	1.804 (1.173-2.774)	0.007*
	First and Second year	87 (56.1%)	68 (43.9%)		

OR – Odds Ratio; 95% CI – 95 Percentage Confidence Interval
*p–value < 0.05 – statistically significant (Chi–square test)

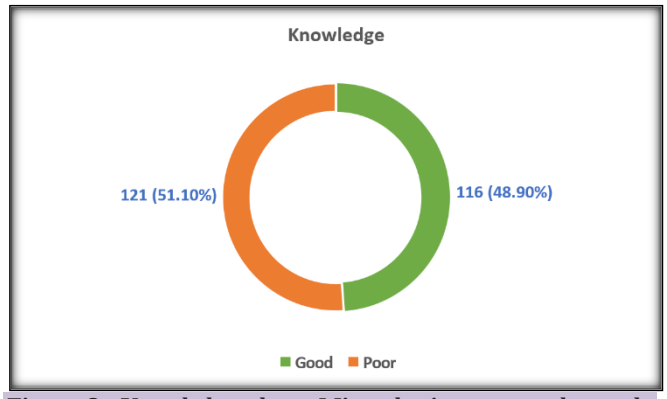

Figure 2: Knowledge about Microplastics among the study participants (n=237)

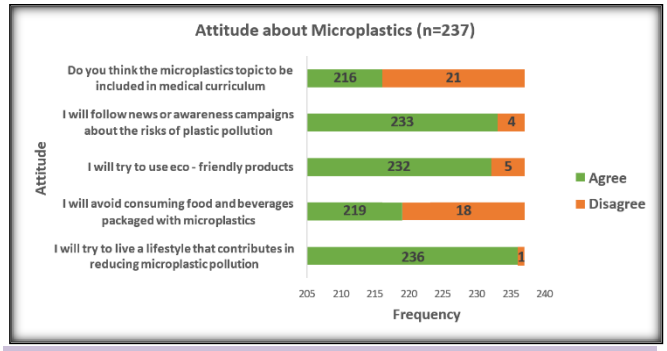

Figure 3: Attitude about Microplastics among the study participants (n=237)

Discussion

The present study was conducted among 370 students to assess awareness, knowledge and attitude regarding microplastics among medical students and their associated sociodemographic factors. The findings demonstrated that 237 (64.1%) of students have heard of microplastics, indicating a moderate level of awareness. This proportion is slightly higher than that reported in similar studies, where correct identification ranged between 60% and 75%.[1,9,10] These findings suggest that while awareness is gradually increasing, it is still not universal among future healthcare professionals.

Despite this, only 48.9% of participants demonstrated good overall knowledge, indicating gaps in comprehensive understanding. Comparable findings have been reported in studies among medical and non-medical students, where moderate knowledge levels were observed despite reasonable awareness.[11,12]

In the present study, half of the participants got information about microplastics from social media and the internet, and 137 (57.8%) think that plastic food packages are sources of microplastics. Similarly, in a study by Patricia Raab among university students in Germany,[11] 57% have read about microplastics on the internet, and 43% think that plastic food packages are sources of microplastics. This finding is in agreement with an earlier study, which reported digital platforms as the leading source of environmental health information among young adults. However, reliance on these sources may contribute to misinformation, underscoring the need for structured academic dissemination of accurate information. Similarly, plastic water bottles and food packaging were recognised as major contributors, consistent with studies identifying single-use plastics as a primary source of environmental microplastic pollution.[6]

In our study, more than 2/3rd of students, 151 (63.7%), have never directly searched for information about microplastics. In contrast, a study by V.Cammellari et al showed that more than 1/3rd of public health residents never searched for microplastics.[1] In the current study, 80% think that microplastics pose environmental risks, while, in contrast, in a study conducted by Reem Saud Almulaifi, 90% of people think that microplastics pose environmental risks, and also a study in Pune's urban population thinks 100% microplastics pose environmental risk.[7,13]

The study revealed a highly positive attitude, with more than 90% of participants expressing willingness to adopt eco-friendly practices and promote awareness. Similar findings have been reported in previous KAP studies, where participants demonstrated strong environmental concern despite moderate knowledge levels.[12,14] This suggests that favourable attitudes may not always translate into adequate knowledge.

Preventive practices were generally satisfactory, with more than 70% of participants reporting appropriate behaviours. However, avoidance of seafood showed relatively lower compliance (45.6%), which may be influenced by cultural dietary habits and limited awareness of contamination pathways. This gap between knowledge and practice has also been documented in previous studies, highlighting challenges in translating awareness into behaviour change.[15] The study also identified significant predictors of awareness. Participants aged above 20 years had higher odds of awareness, which is consistent with findings from previous studies indicating that increasing age and academic exposure are associated with improved environmental knowledge.[16] Similarly, students in clinical years demonstrated higher awareness compared to preclinical students, likely due to increased exposure to health-related topics. Female participants had higher awareness than males, a finding supported by earlier research reporting greater environmental concern and health awareness among women.[16]

Overall, the study's results are in line with previous research, showing a reasonable level of awareness, positive attitudes, and generally excellent practices, but pointing out gaps in thorough understanding and particular preventative behaviors. These findings highlight the necessity of organized educational initiatives to advance sustainable practices and enhance comprehension. These findings all highlight the significance of microplastic education initiatives. Raising the general public's awareness of microplastics might improve their attitude toward using fewer of them. In order to assist avoid the use of microplastics and pollution, health care professionals and students should also get instruction on the topic in pre- and post-graduate courses.

A few limitations apply to this investigation. Since it is a cross-sectional study, causal links cannot be established. Generalizability was limited because the investigation was only carried out in one institution. The self-reported nature of the data may have introduced social desirability bias and recall bias. Furthermore, there was a dearth of thorough evaluation of the body of evidence about the health consequences of microplastics.

Recommendations

It is advised that environmental health subjects, such as microplastics, be included in the medical curriculum. Workshops and awareness campaigns should be held to advance evidence-based information and increase understanding. The goal of behavioural treatments should be to close the knowledge-practice gap. To evaluate trends and the efficacy of treatments, more multicentric and longitudinal research is advised.

Conclusion

Medical students lack adequate practical training and experience, but they do have a rudimentary understanding of microplastics and often have good views toward their elimination. Medical education must incorporate targeted curriculum material, practical instruction, and ethical conversations in order to close these disparities. By strengthening these areas, future medical professionals will be better equipped to advocate for the elimination of microplastics and so lessen the pollution that microplastics produce.

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Conflicts of interest

There are no conflicts of interest.

References

1. Cammalleri V, Marotta D, Antonucci A, Protano C, Fara GM. A survey on knowledge and awareness on the issue “microplastics”: a pilot study on a sample of future public health professionals. Ann Ig. 2020;32(5):577–89. doi:10.7416/ai.2020.2377 PubMed PMID: 32744588.
2. World Health Organization. Microplastics in drinking-water [Internet]. 2019 [cited 2026 Apr 16]. Available from: https://www.who.int/publications/i/item/9789241516198
3. Chandra S, Walsh KB. Microplastics in water: Occurrence, fate and removal. Journal of Contaminant Hydrology. 2024;264:104360. doi:10.1016/j.jconhyd.2024.104360
4. World Health Organization. Dietary and inhalation exposure to nano- and microplastic particles and potential implications for human health [Internet]. 2022 [cited 2026 Apr 16]. Available from: https://www.who.int/publications/i/item/9789240054608
5. Oleksiuk K, Krupa-Kotara K, Wypych-Ślusarska A, Głogowska-Ligus J, Spychała A, Słowiński J. Microplastic in Food and Water: Current Knowledge and Awareness of Consumers. Nutrients. 2022;14(22):4857. doi:10.3390/nu14224857 PubMed PMID: 36432543; PubMed Central PMCID: PMC9695129.
6. Rahman M, Shekhar H, Shishir TH, Bhuiyan MMU, Hasan Z, Tushar MAN, et al. Evaluation of public knowledge and attitudes concerning microplastic pollution: A study in Saint Martin’s Island, Bangladesh. Heliyon. 2025;11(6):e43107. doi:10.1016/j.heliyon.2025.e43107
7. AlMulaifi RS. Consumer Awareness of The Environmental and Health Risks of Micro plastics Pollution. 2025.
8. https://www. Microplastics: The long legacy left behind by plastic pollution [Internet]. 2023 [cited 2026 Apr 16]. Available from: https://www.unep.org/news-and- stories/story/microplastics-long-legacy-left-behind-plastic-pollution
9. Premarathna WMKN, Madawala HMSP, Gunaratne AMTA, Abeysundara SP. Awareness and perceptions on microplastics: a case study from Sri Lanka [Internet]. Postgraduate Institute of Science (PGIS), University of Peradeniya, Sri Lanka; 2022 [cited 2026 Apr 16]. Available from: https://ir.lib.pdn.ac.lk/handle/20.500.14444/7653
10. Zhang K, Hamidian AH, Tubić A, Zhang Y, Fang JKH, Wu C, et al. Understanding plastic degradation and microplastic formation in the environment: A review. Environ Pollut. 2021;274:116554. doi:10.1016/j.envpol.2021.116554 PubMed PMID: 33529891.
11. Raab P, Bogner FX. Conceptions of university students on microplastics in Germany. Dahms HU, editor. PLoS ONE. 2021;16(9):e0257734. doi:10.1371/journal.pone.0257734
12. Wang J, Tan Z, Peng J, Qiu Q, Li M. The behaviors of microplastics in the marine environment. Mar Environ Res. 2016;113:7–17. doi:10.1016/j.marenvres.2015.10.014 PubMed PMID: 26559150.
13. Mistry M, Joshi SG. Unveiling Microplastic Ignorance: A Study on Knowledge and Awareness Among Pune’s Urban Population – A Mixed Method Approach. Nat Env Poll Tech. 2025;24(1):B4142. doi:10.46488/NEPT.2025.v24i01.B4142
14. Vicente-Molina MA, Fernández-Sáinz A, Izagirre-Olaizola J.

Environmental knowledge and other variables affecting pro-environmental behaviour: comparison of university students from emerging and advanced countries. Journal of Cleaner Production. 2013;61:130–8. doi:10.1016/j.jclepro.2013.05.015

15. Kollmuss A, Agyeman J. Mind the Gap: Why do people act environmentally and what are the barriers to pro-environmental behavior? Environmental Education Research. 2002;8(3):239–60. doi:10.1080/13504620220145401
16. Prata JC, da Costa JP, Lopes I, Duarte AC, Rocha-Santos T. Environmental exposure to microplastics: An overview on possible human health effects. Sci Total Environ. 2020;702:134455. doi:10.1016/j.scitotenv.2019.134455 PubMed PMID: 31733547.