

**Research Article**

# Microplastic Contamination in Commercial Poultry Feed and Edible Chicken Tissues: An Emerging Environmental Concern

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**Abstract**

Due to the widespread presence in food stuff like chicken, fish, meat, milk, sugar, salt, honey, microplastics (MPs) are an emerging environmental health concern nowadays. This study aimed to investigate the presence of MP particles in commercial poultry feed and edible tissues of chickens around Rajshahi City of Bangladesh. A total of 10 feed samples and 30 chicken meat samples (breast, liver, gizzard) from five different poultry farms were analysed. MPs were detected in all sample types and the detected particles were less than 1 mm and greater than 1  $\mu$ m in size. A total of 758 MP particles were collected from 10 feed samples and 30 chicken samples (breast, liver and gizzard of 10 chickens of 3 different variant) belonging to 5 different poultry farms. A total of 187 MP particles were collected from 10 feed samples, with a mean of  $18.7 \pm 2.40$  MPs / g of feed. A total of 571 MP particles were collected from 30 chicken samples (breast, liver and gizzard of 10 chickens of 3 different variant), with a mean of  $0.95 \pm 0.03$  MPs / g of chicken meat sample. Four different types of shapes of MP particles (fibres, fragments, pellets and sheets) were identified from the feed samples and the chicken meat samples. Among these, fibres were the dominant type of shapes in both sample types (feed and chicken meat). Six different colors (red, blue, green, yellow, violet, transparent) were observed in the MP particles collected from the feed and chicken meat samples. The predominant colors of particles collected from feed and chicken flesh samples were red and transparent, respectively. Detected polymers included polyethylene Terephthalate (PET), polyethylene (PE), and polypropylene (PP). The study results reveal that poultry feed is a primary route of MP exposure and that edible parts of chickens are highly contaminated with MPs at levels comparable to global trends. This suggests potential human exposure through poultry consumption and highlights the need for regulatory monitoring and feed quality control.

**Keywords:** Microplastics, poultry feed, chicken meat, FTIR, environmental contamination, fibres, polymer types

## 1. Introduction

Microplastics, typically defined as plastic particles smaller than 5mm in diameter have emerged over the past decades as ubiquitous pollutants in virtually all ecosystems, from oceans and rivers to soils and atmosphere. Their persistence, small size and propensity to adsorb other contaminants make them an environmental and health concern [1]. The continual rise in poultry product consumption can be attributed to relatively low production costs, higher feed conversion efficiency and the increasing demand for protein-rich diets to meet human nutritional needs [2]. Moreover, the growing availability and variety of processed poultry products have promoted their incorporation into diverse cuisines and dietary patterns globally, thereby accelerating their consumption [3].

In the context of poultry production, microplastic exposure poses an emerging and underexplored risk. Poultry may ingest microplastics directly via contaminated feed, water or soil; or indirectly through environmental dust and airborne particles.

Several studies have already detected microplastics in chicken excreta, gizzard content and tissues, underscoring the penetration of these pollutants into the food chain [4]. Evidence also suggests that when microplastics are introduced to the environment, they bioaccumulate, enter into the food chain and may negatively influence the organisms [5, 6]. When ingested, the harmful impacts may reduce chicken quality, which is of considerable thought for humans who consume chicken as a significant part of their meals. Several researches have documented the diverse harmful effects of microplastics in organisms, with reduced survival, altered behaviour, reduced reproduction rates, a decline in body size, reduced motility, increased inflammation including neurotoxicity, oxidative stress, intestinal defects, genotoxicity and altered energy and fat metabolism being just a few of the significant adverse effects on animal health and development [7-11]. Particularly, worrisome is the possibility that



microplastics from feed may act as a primary exposure route. Feed raw materials (such as corn meal, soybean meal) and feed processing steps are potential points of microplastic contamination [12].

Despite the growing global concern about microplastic contamination in the environment and food systems, research on microplastic exposure in poultry through feed remains extremely limited. Most available studies have focused on aquatic organisms, particularly fish and shellfish, where microplastic occurrence, accumulation, and toxic effects have been well documented [13-14]. In contrast, the terrestrial food chain especially livestock and poultry have received comparatively little scientific attention.

Existing literature has confirmed the presence of microplastics in poultry excreta, gastrointestinal tracts, and tissues, indicating possible ingestion and bioaccumulation [4]. Only a few investigations have attempted to quantify microplastics in commercial poultry feeds or raw feed ingredients such as fishmeal and soybean meal [1,12]. Moreover, detection and quantification protocols for microplastics in feed matrices and the edible parts of chickens like breast, liver, gizzard are still lacking, leading to inconsistencies in reported concentrations and particle characteristics.

Regionally, data from developing countries such as Bangladesh are negligible despite high poultry production rates and widespread use of commercially formulated feeds [12]. While microplastics have been detected in Bangladeshi aquatic systems and fish feeds [15], no published studies have systematically evaluated their presence in poultry feeds, birds, or farm environments. This lack of baseline data hinders risk assessment, policymaking, and the development of mitigation

strategies within the poultry sector. Therefore, comprehensive research is urgently needed to detect and quantify the levels and types of microplastics in poultry feeds and edible tissues of poultry chickens in Bangladesh. The aim of this study was to inquire the occurrence and characteristics of microplastics found in the commercial poultry feeds and edible tissues of consumer chickens around the Rajshahi city, Bangladesh. The information of this study will be useful for further risk assessment of microplastics to poultry in Bangladesh and human health risk assessment.

## 2. Materials and Methods

### 2.1. Sample collection

Five poultry feed samples and five chickens were collected from five different poultry farms around Rajshahi City, Bangladesh, for analysis. The chickens comprised one cock, two broilers, and two layers. Three edible tissues, breast muscle, liver, and gizzard were analysed for microplastics. Sample collection and analytical procedures were repeated after one month at the same farms. The average age of the chickens was  $43.51 \pm 2.7$  days and weight was  $1.7 \pm 0.3$  kg. Figure 1 shows the farm locations from where the samples were collected.

The feed samples were collected in aluminium containers. All the chicken samples were killed and dissected immediately with no food administered outside the farms; chicken breasts, livers and gizzards were transferred to pre-labelled aluminium container, then feed samples and chicken samples were stored in a freezer at  $-80^{\circ}\text{C}$  for further analysis.

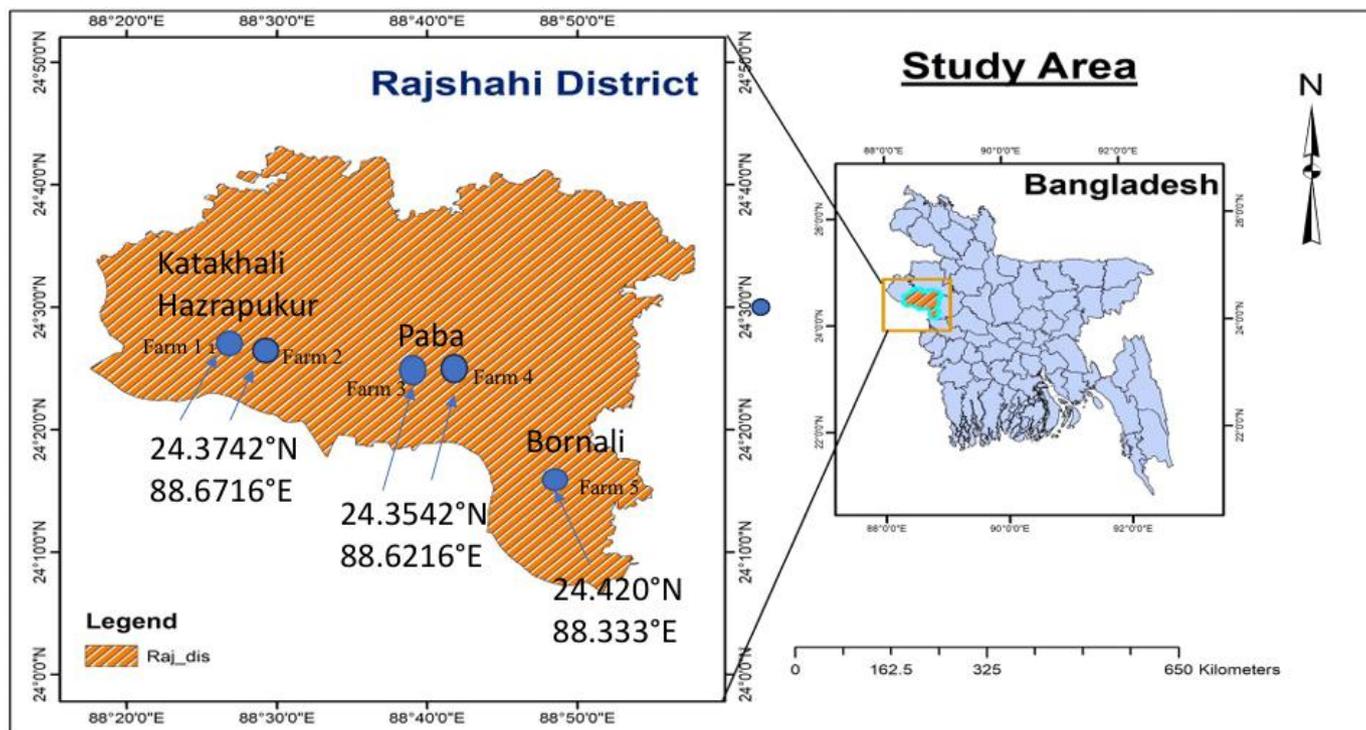


Figure 1. Sampling map of Rajshahi district showing the locations of five different farms.

## 2.2. Sample Preparation

### 2.2.1. Break down process of organic matter

#### 2.2.1.1 Fenton reactions

The procedure of Rodrigues et al. [16] that discussed the Fenton reaction employed for microplastics extraction from estuarine waters, was applied to feed samples and modified version of the same procedure was applied for the chicken meat samples. Before analysis feed and chicken samples were brought out of the freezer and thawed to room temperature. Each feed sample was dried to the oven at 60°C temperature overnight to make moisture free and grinded to fine powder using mortar and pestle before analysis. Each feed sample (1g) was placed in a glass flask with 20 mL 0.05 M Fe<sup>2+</sup> solution and two sub-subsequent aliquots of 20 mL of 30 % H<sub>2</sub>O<sub>2</sub> (added at t = 0 min and t = 30 min respectively). For chicken meat sample, 1g of each flesh sample was placed in a glass flask (500mL glass beaker was used). The reaction was performed on a hot plate at 75°C under stirring conditions (300 rpm, magnetic stirrer) for 1 h. To acquire the complete removal of organic matter, progressive Fenton reactions were tested (from one to three subsequent reactions), each one followed by a filtration step through a metallic sieve.

#### 2.2.1.2. Alkaline digestion coupled with Fenton reaction

Because of the high amount of interfering organic substances present in the feed matrices and the chicken flesh observed, an alkaline digestion pre-treatment was applied before the Fenton reactions. Tests were performed with 40mL of KOH (10%) at 60°C [17], studying the effect of different incubation times (namely 6 h, 18 h and 24 h). After the alkaline digestion, one, two or three Fenton reactions (section 2.2.1.1) were performed according to the need of the experiment for the complete digestion of the organic matter. Each reaction was followed by filtration through a metallic sieve (section 2.2.1.1). At the end of each trial, the final filtrate was dried at 60°C in oven and was transferred into a glass Petri dish for the identification and quantification procedures.

#### 2.2.3. Density Separation

After that density separation step was done to separate microplastic particles by floatation. For density separation NaCl (3:1 v/v) was added to the flask content after digestion and the mixture was stirred for 20 min before a 24 h settlement [18].

#### 2.2.4. Filtration

After that the flask content was filtered through glass microfiber filter paper (pore size 2.5µm and diameter 47mm) using vacuum filtration process. After pouring the flask content to the filter paper, the flask is rinsed three times with double distilled water to ensure the complete transfer of the flask content to the filter paper and also to remove any residual water-soluble contamination. After the oxidation step, the filter paper containing the filtrate was dried at 60°C overnight at the oven and transferred the dried filter paper into a glass Petri dish to observe it by a stereomicroscope.

## 2.3. Analysis of the particles identified

### 2.3.1. Microscopic analysis

The filter papers stored in the Petri dish were observed carefully at the stereomicroscope at magnification (10x and 40x). The color, size and shape of MP particles observed in the filter paper by the stereomicroscope were listed carefully for further data analysis.

### 2.3.2. FTIR analysis

The filtrates accumulated in the filter paper were sent for FTIR analysis to the Central Science Lab of Rajshahi University to detect the polymer type of the particles observed in the filter paper. FTIR analysis was done using KBr method.

## 2.4. Laboratory Contamination Control

All laboratory equipment, including chemicals and glassware, were covered with aluminium foil when not used, because the samples were processed there. Distilled water and reagents were also filtered and covered in aluminium foil to protect them from environmental pollution. A few filter papers were implemented throughout the laboratory for 72 h in different positions to count the suspended load of microplastics from the environment. After that, these filter papers were examined with a stereomicroscope. Five filter papers and procedural blanks were reviewed during the analysis and kept as a control, no particles were detected in those filter papers and procedural blanks. Lab coat, hand gloves and mask were used during the experiment to prevent contamination. All possible precautions were taken to prevent airborne contamination of the samples.

## 2.5. Data analysis

The data obtained during this study were subjected to Microsoft Excel to obtain the means and standard deviation.

## 3. Results and Discussion

### 3.1. Abundance of collected microplastics (MPs)

A total of 758 microplastic particles were collected from 10 feed samples and 30 chicken samples (breast, liver and gizzard of 10 chickens of 3 different variant) belonging to 5 different poultry farms. A total of 187 microplastic particles were collected from 10 feed samples, with a mean of 18.7 ± 2.40 microplastics / g of feed. The highest abundance was detected in feed samples from farm no. 3, with a mean of 32 ± 4.24 microplastics / g of feed, and the lowest concentration was detected in farm no. 5 with mean of 12 ± 1.41 microplastics / g of feed (Table 1). Figure 2 shows microscopic images of different types of obtained microplastics from feed samples.

A total of 571 microplastic particles were collected from 30 chicken samples (breast, liver and gizzard of 10 chickens of 3 different variant), with a mean of 0.95±0.03 microplastics / g of chicken meat sample. The highest abundance was detected in broiler chicken gizzard and layer chicken gizzard from farm no. 2 and 5 with mean values of 1.42±0.03 microplastics / g of gizzard and 1.42±0.03 microplastics / g of

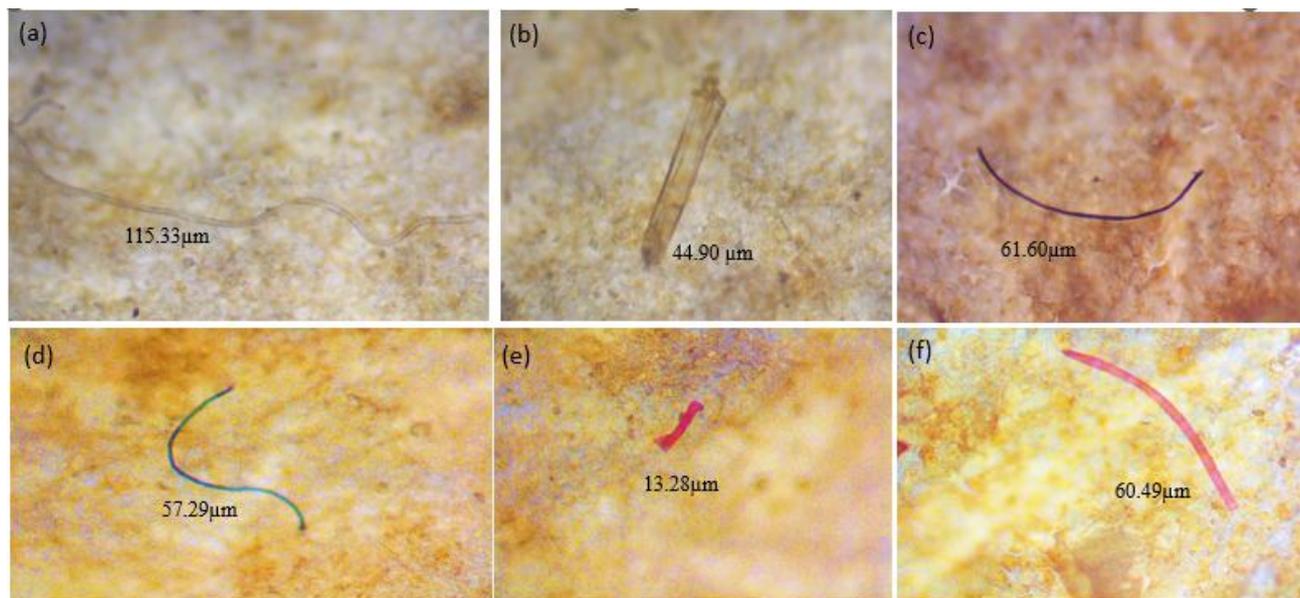
gizzard, respectively (Table 2). The lowest abundance was detected in layer chicken breast from farm no. 3 with a mean of  $0.57 \pm 0.03$  microplastics / g of breast (Table 2). Figure 3 shows microscopic images of different types and colors of obtained microplastics from chicken meat samples.

The study reveal that the microplastic content in chicken sample like breast, liver and gizzard fall in the range of globally reported values which found 303 microplastic particles in five chicken samples with a mean of 60.5 MPs / bird [19]. Microplastic particles were obtained by Huerta et al. [20] from a chicken's gizzard ( $57 \pm 41.1$  MPs / gizzard). Deoniziak et al. [21] analysed two bird species, where a total of 1073 microplastic particles were obtained by them with a mean value of  $31.56 \pm 32.5$  microplastics per individual ; 722

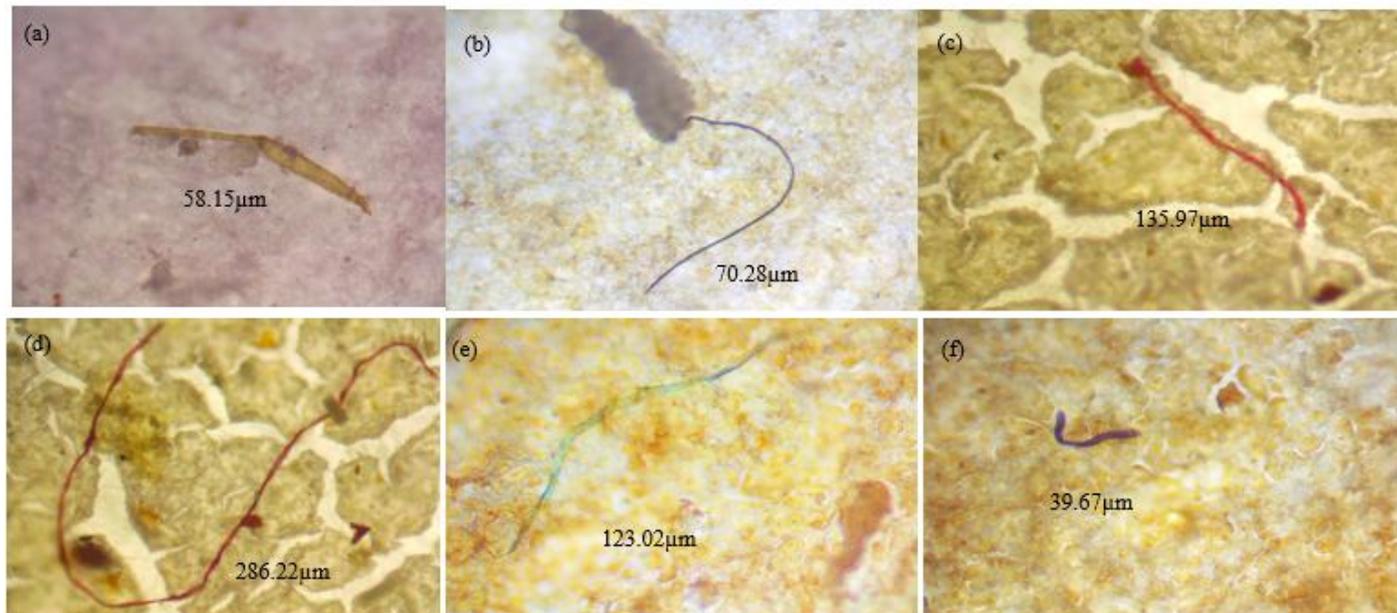
microplastic particles were collected from gizzards of blackbirds and song thrushes [21]. A 442 particles were collected from 43 bird samples by Collard et al. [22] with an average of  $10.3 \pm 1.8$  microplastics per individual, where the highest number of particles were found in gizzards (4.60 MPs / gizzard). Zhao et al. [23] have analysed the gastrointestinal tract (GIT) of 16 bird samples and found 364 microplastic particles from them, with a mean of 22.7 / GIT. Bilal et al. [4] have found a mean of  $33.25 \pm 17.8$  MPs / gizzard and  $17.8 \pm 12.1$  MPs / crop of chicken samples collected from eight different poultry farms. Generally, the contamination of feeds is the primary reason of the concentration of microplastics detected, as these particles are potentially ingested through feed by the chickens.

**Table 1.** Feed type, feed size, number of microplastics/g of feed, microplastics size range in  $\mu\text{m}$ , mean size ( $\mu\text{m}$ ) of microplastics  $\pm$  SD belonging to different farms.

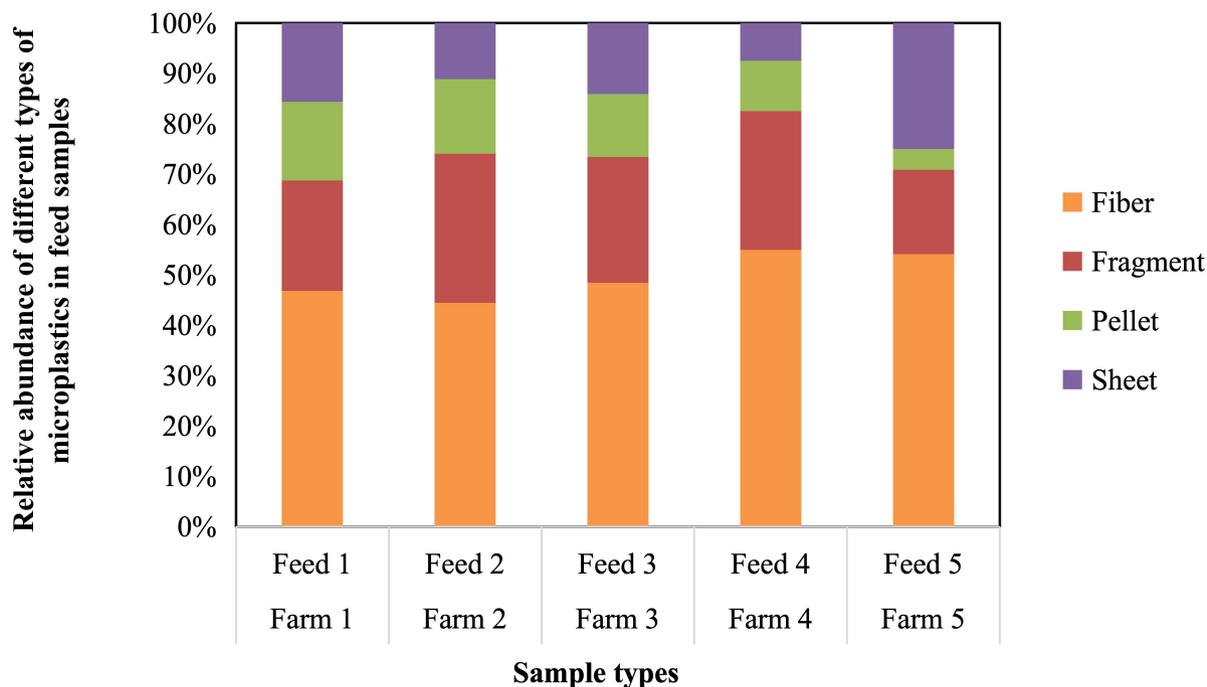
Farm no.	Sample no.	Feed type	Feed size range (mm)	No. of microplastics / g $\pm$ SD	Microplastics size range ( $\mu\text{m}$ )	Mean size ( $\mu\text{m}$ ) of microplastics $\pm$ SD
1	Feed 1	Pellet	2-2.5	16 $\pm$ 1.41	69.19-115.9	89.75 $\pm$ 12.72
2	Feed 2	Pellet	2.5-2.7	13.5 $\pm$ 2.12	75.5-212	99.40 $\pm$ 35.76
3	Feed 3	Pellet	1.5-2.5	32 $\pm$ 4.24	5.71-158.73	71.78 $\pm$ 28.26
4	Feed 4	Powder	0	20 $\pm$ 2.82	60.49-106.7	78.63 $\pm$ 13.01
5	Feed 5	Pellet	1.7-2.6	12 $\pm$ 1.41	81.9-288	125.07 $\pm$ 58.44



**Figure 2.** Microscopic images (at 10x and 40x magnification) of some of the collected microplastics from feed samples representing different particle shapes and color: (a) Transparent fibre, (b) Transparent sheet, (c) Blue fibre, (d) Green fibre, (e) Red pellet, (f) Red fibres.



**Figure 3.** Microscopic images (at 10x and 40x magnification) of some of the collected microplastics from poultry chicken meat samples representing different particle shapes and color: (a) Yellow Sheet from cock chicken liver, (b) Blue fibre from broiler chicken gizzard, (c, d) Red fibres from layer chicken gizzard, (e) Green fibre from broiler chicken gizzard, (f) Violet fibre from layer chicken liver.



**Figure 4.** Relative abundance percentage of different types of shapes of microplastics particles obtained from feeds from all five farms.

**3.2. Size**

The size range of MPs found in the feed samples was between 5.71-288 μm (Table 1), with an average size of 92.92 ± 29.64 μm. The size range of MPs found in the chicken meat samples

was between 28.38-286.22 μm (Table 2), with an average size of 87.31 ± 18.35 μm. All the MP particles observed in this study are greater than 1 μm and less than 1 mm in size. Liu et al. [24], have observed MP particles and reported that the abundant particles were in the range of 500-1000 μm. Zhu et al. [25] have collected MP particles from the GIT of birds

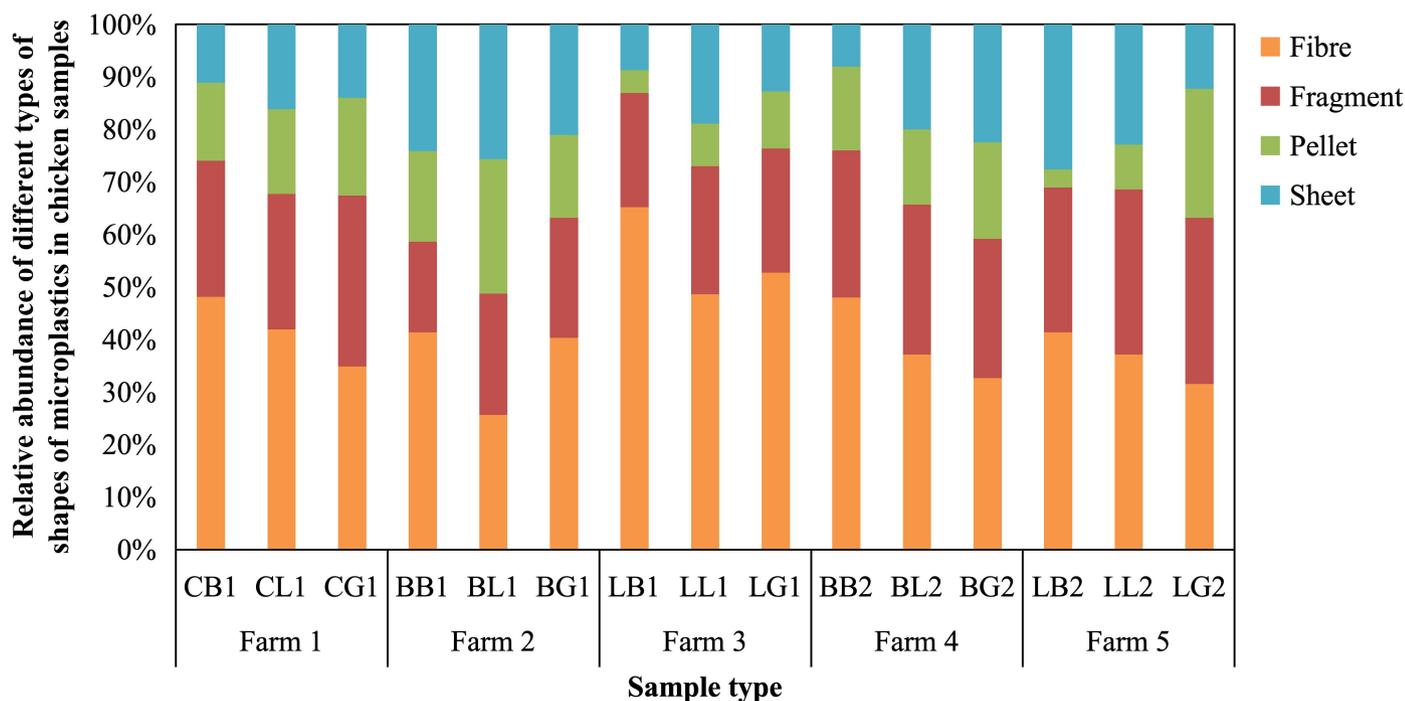
where 92.9% of the consisting particles were > 5 mm in size. The possible availability for relatively larger particles may be because of less movement of larger particles in the GIT tract and hence trapped particles submerge in different parts of the GIT, including breast, liver, gizzard etc. The smaller particles have more movement through the GIT and tend to pass through faeces. Variation in the sizes of collected MP particles was observed, likely due to size-selective uptake in birds influenced by multiple factors, including feeding behavior, contaminated feed, bedding materials, and drinking water [4, 26]. Particles larger than 150 µm are generally too big to cross the gastrointestinal barrier and are excreted in faeces. However, smaller particles (<150 µm) can penetrate tissues and deposit in the muscle (meat) or organs. Once ingested, larger plastic fragments can be further ground down by the bird's gizzard, a muscular organ used for mechanical digestion. This "grinding" can turn a single large particle into many smaller ones of varying sizes before they enter the bloodstream [27].

### 3.3. Shapes

Based on the geometry and shape of the particles, four different types of shapes (fibres, fragments, pellets and sheets) were identified from the feed samples and the chicken meat samples. Among these, fibres were the dominant type of shapes in both sample types (feed and chicken meat). The

abundance percentages of these different types of shapes in feeds were, in decreasing order, fibres (49.73%), fragments (24.59%), sheets (13.90%) and pellets (11.76%), while in chicken meat samples they were fibres (40.63%), fragments (26.27%), sheets (17.86%) and pellets (15.24%). Figure 4 represents relative abundance percentage of different shapes of microplastic particles in each type of feed sample collected from all five farms. Figure 5 represents relative abundance percentage of different shapes of microplastic particles in each type of chicken meat samples.

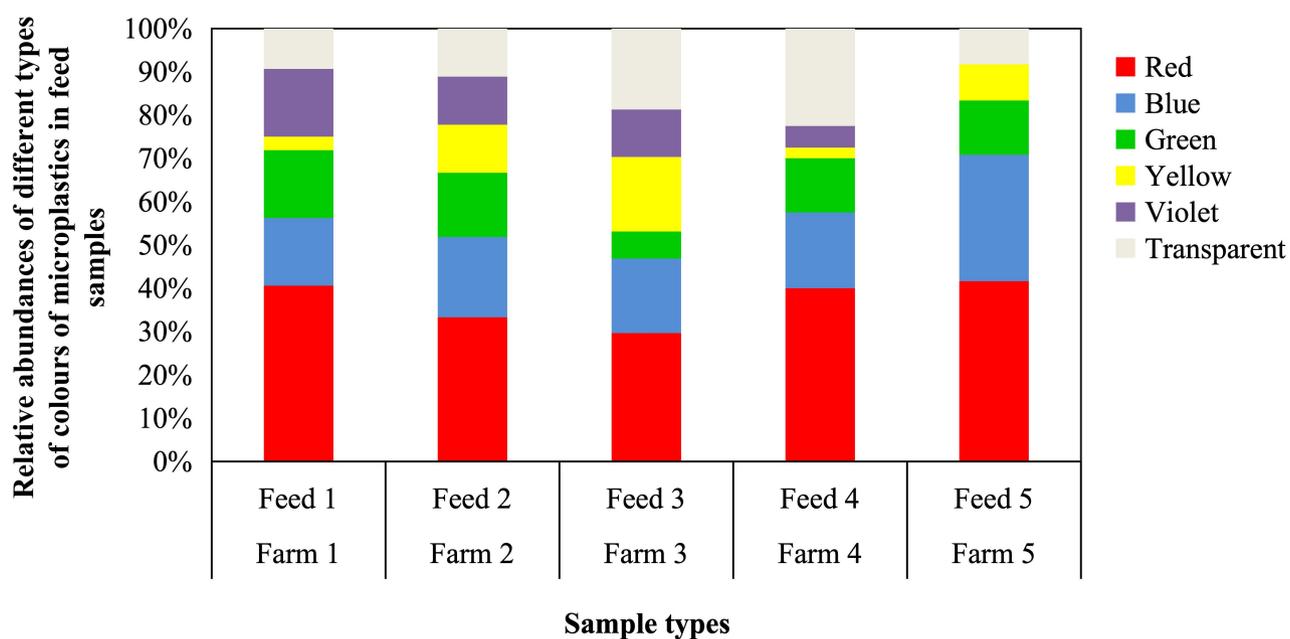
Deoniziak et al. [21] have reported fibre as a dominant shape (84%) of the particles in their finding and fragment as a minor fraction (10%). Weitzel et al. [28] have found 98% of fibre in their study where they found fragment only 2%. Susanti et al. [29] have reported film as a dominant shape (75%) who have obtained microplastic particles from the GIT of the little black cormorant (*Phalacrocorax sulcirostris*), followed by fibre (18.7%) and fragment (6.3%). Carlin et al. [30] have preserved microplastic particles from the GIT consisting of 86% fibres and 13% fragments, followed by 0.3% beads in their findings. The reason behind the dominance of fibre-type particles in breasts, livers and gizzards might be due to less mobility in the GIT tract and difficulty in excretion through faeces. Another possibility could be that chickens mistake the brightly pigmented plastic pieces on the ground as food and selectively ingest them.



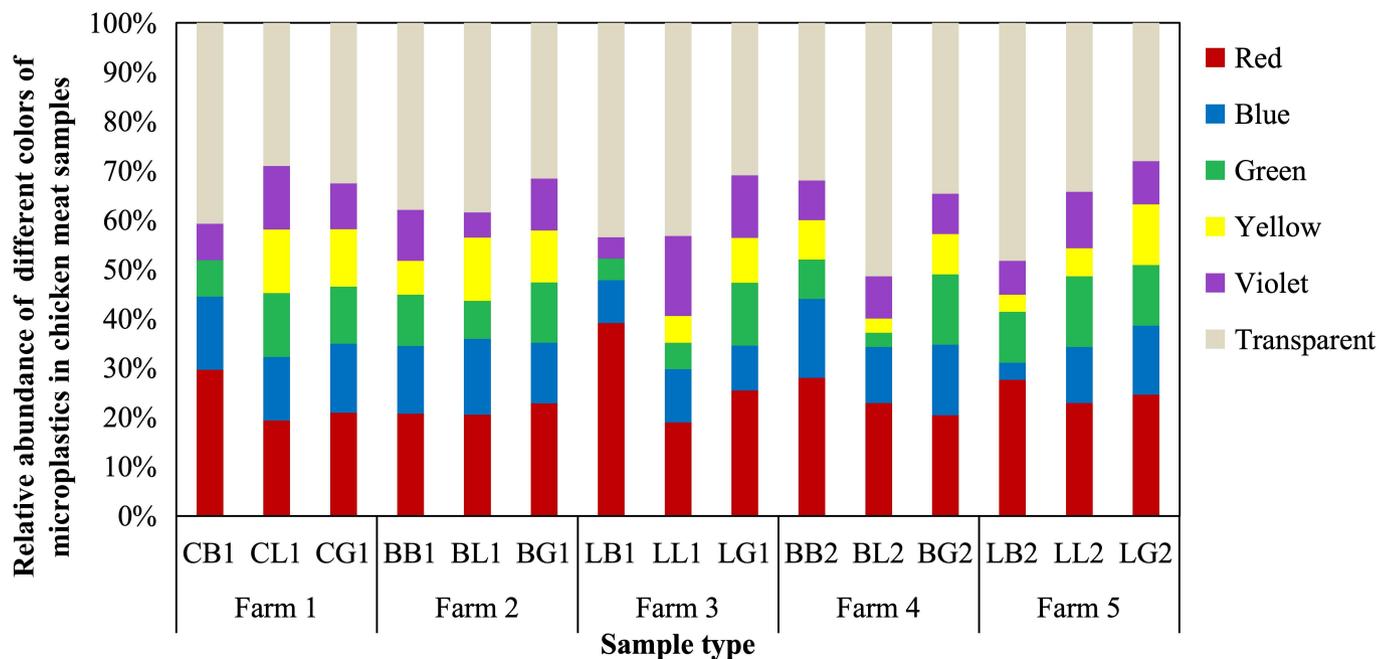
**Figure 5.** Relative abundance percentage of different types of shapes of microplastic particles obtained from poultry chicken meat samples from all five farms (CB = Cock breast, CL= Cock liver, CG = Cock gizzard, BB = Broiler breast, BL=Broiler liver, BG=Broiler gizzard, LB = Layer breast, LL= Layer liver, LG = Layer gizzard).

**Table 2.** Farm number, sample type, number of microplastics / g of sample, microplastics size distribution and mean size of microplastics in chicken meat samples.

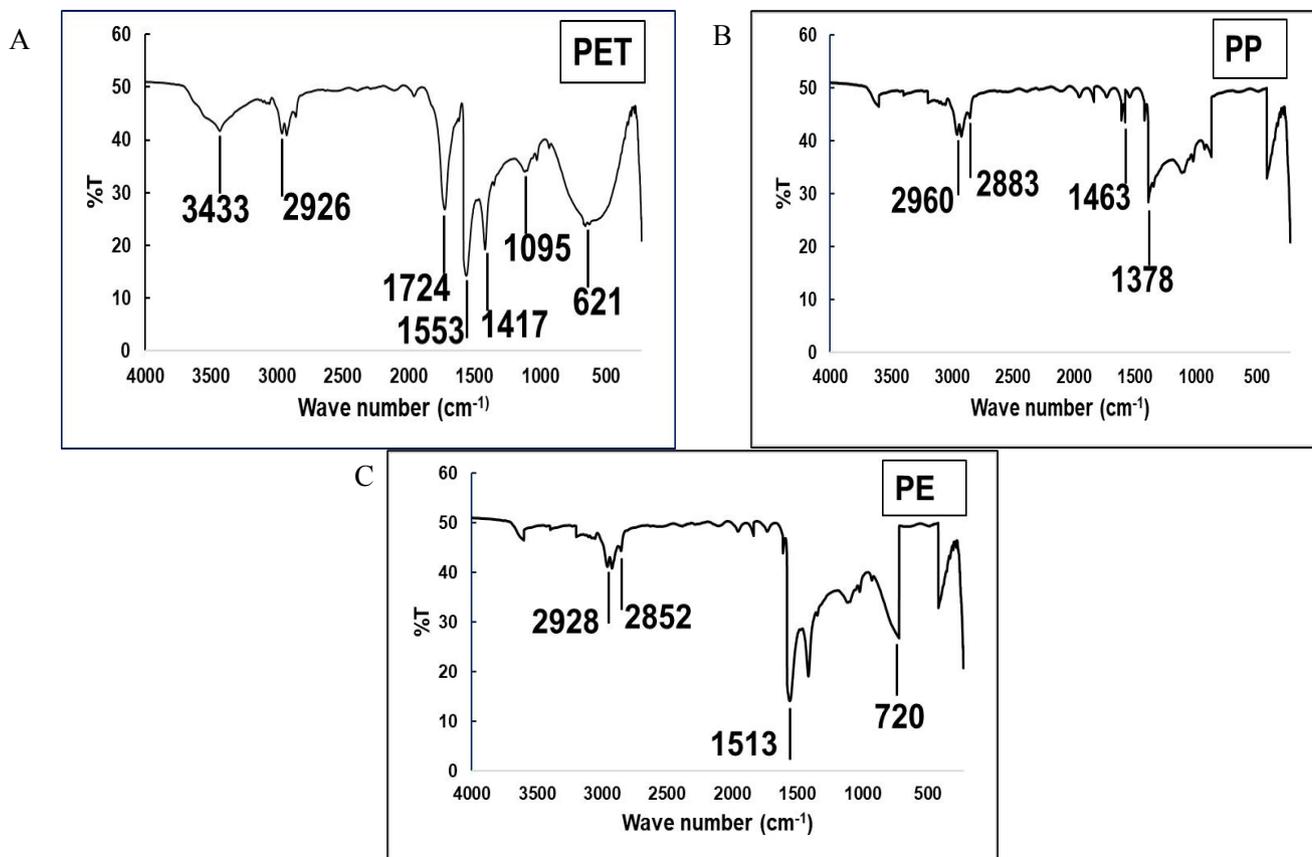
Farm no.	Sample no.	Sample type	No. of microplastics / g ± SD	Microplastics size range (µm)	Mean size (µm) of microplastics ± SD
Farm 1	CB1	Cock chicken breast	0.67±0.03	43.45-90.50	61.41±14.31
	CL1	Cock chicken liver	0.77±0.03	65.70-108.22	80.43±12.98
	CG1	Cock chicken gizzard	1.07±0.03	78.86-129.32	91.75±14.35
Farm 2	BB1	Broiler chicken breast	0.72±0.03	28.38-70.25	45.24±12.59
	BL1	Broiler chicken liver	0.97±0.03	73.51-139.55	92.35±16.40
	BG1	Broiler chicken gizzard	1.42±0.03	113.50-286.22	176.82±51.24
Farm 3	LB1	Layer chicken breast	0.57±0.03	39.77-92.80	66.43±16.91
	LL1	Layer chicken liver	0.92±0.03	51.81-138.80	73.24±20.53
	LG1	Layer chicken gizzard	1.37±0.03	68.21-123.02	84.32±11.94
Farm 4	BB2	Broiler chicken breast	0.62±0.03	30.50-78.24	56.56±16.46
	BL2	Broiler chicken liver	0.87±0.03	74.19-105	87.18±13.63
	BG2	Broiler chicken gizzard	1.22±0.03	115.90-238	157.77±29.32
Farm 5	LB2	Layer chicken breast	0.72±0.03	42.25-105	76.92±14.01
	LL2	Layer chicken liver	0.87±0.03	55.45-129	76.48±20.11
	LG2	Layer chicken gizzard	1.42±0.03	69.50-120.50	82.82±10.50



**Figure 6.** Color composition of the microplastic particles identified in feed samples from all five farms.



**Figure 7.** Color composition of microplastic particles identified in poultry chicken meat samples from all five farms. CB=cock breast, CL=cock liver, CG=cock gizzard, BB=broiler breast, BL=broiler liver, BG=broiler gizzard, LB=layer breast, LL=layer liver, LG=layer gizzard.



**Figure 8.** FTIR spectra of the identified polymer types in the present study. (A) Polyethylene terephthalate (PET); (B) Polypropylene (PP); (C) Polyethylene (PE).

### 3.4. Color

The particles obtained from feeds and chicken flesh samples were noticed in six different colors (red, blue, green, yellow, violet, transparent). Among these, red color was prominent in particles extracted from the feed samples, while transparent was dominant in particles extracted from the chicken meat samples. The abundance percentages of the particles in the feed samples were, in decreasing order, red (35.82%), blue (18.72%), transparent (15.51%), green (11.23%), yellow (9.63%), violet (9.09%), while in the chicken meat samples, the percentages of different colors of the particles were transparent (36.07%), red (23.64%), blue (12.25%), green (10.33%), violet (9.63%), yellow (8.06%). Figure 6 represents the relative abundance of percentages of colors of microplastic particles obtained from each type of feed samples from all five farms. Figure 7 represents the relative abundance percentages of colors of microplastic particles obtained from each type of chicken meat samples from all five poultry farms.

Deoniziak et al. [21] have found transparent color as dominant color, followed by brown, with percentages of 74% and 14%, respectively in their study. In another study, Tokunaga et al. [31] have obtained microplastics from the GIT of the little black cormorant (*Phalacrocorax sulcirostris*), where the dominant colors were transparent (56.2%), followed by red (18.7%) and black (12.5%), while blue and yellow color were the same percentage (6.2%). Carlin et al. [30] have collected microplastic particles from the GIT tract where the color of the majority of the particles were transparent or royal blue. Bustamante et al. [32] have reported that the majority of the colors that they have found in their study were blue (41.4%), followed by red (20.7%) and black (20.7%). These two dominant colors (red and transparent) may be due to their colorful nature (for red color) and can be easily camouflage themselves in the chicken foodstuff like feed (transparent color) and chickens mistake brightly colored plastic pieces for food.

### 3.5. Detected polymer types

Many studies have been carried out with Fourier transform infrared spectroscopy (FTIR) for identification of the chemical composition of the polymer type of these microplastics. For chemical identification this is the most popular approach nowadays and works on a species-specific frequency absorbance of IR radiation. To assess the composition of the particles, the peak similarity index was used by comparing recorded and standard peaks. Three types of polymers were detected: polyethylene Terephthalate (PET), polyethylene (PE) and polypropylene (PP) (Figure 8). The analysis of the detected polymer types from the FTIR spectra in the current study is given below:

**PET Analysis:**  $3433\text{ cm}^{-1} = \nu(\text{O-H})$  stretching,  $2926\text{ cm}^{-1} = \nu(\text{C-H})$  stretching,  $1724\text{ cm}^{-1} = \nu(\text{C=O})$  stretching,  $1553\text{ cm}^{-1} = \nu(\text{C=C})$  in benzene ring,  $1417\text{ cm}^{-1} = \nu(\text{C-O})$  stretching,  $1095\text{ cm}^{-1}$  due to methylene ( $-\text{CH}_2-$ ) group and  $621\text{ cm}^{-1}$  due to interaction between ester group and benzene ring. Figure 8A shows FTIR spectra of detected polymer in this study

which matches the FTIR spectra of polyethylene terephthalate. **PP Analysis:**  $2960\text{ cm}^{-1} = \nu(\text{C-H})$  asymmetric stretching,  $2883\text{ cm}^{-1} = \nu(\text{C-H})$  symmetric stretching,  $1463\text{ cm}^{-1} = \nu(\text{C-H})$  bending (scissoring),  $1378\text{ cm}^{-1} = \nu(\text{C-H})$  bending (umbrella). Figure 8. B shows FTIR spectra of detected polymer in this study which matches the FTIR spectra of polypropylene polymer.

**PE Analysis:**  $2928\text{ cm}^{-1} = \nu(\text{C-H})$  asymmetric stretching,  $2852\text{ cm}^{-1} = \nu(\text{C-H})$  symmetric stretching,  $1513\text{ cm}^{-1} = \nu(\text{C-H})$  bending,  $720\text{ cm}^{-1} = \nu(\text{C-H})$  rocking. Figure 8. C shows FTIR spectra of detected polymer in this study which matches the FTIR spectra of polyethylene polymer.

Figure. 8 shows different polymer types identified in this study.

Different polymer types have been reported in different studies in their findings. Bilal et al. [4] have detected four types of polymers: polyvinyl chloride (PVC), low-density polyethylene (LDPE), polystyrene (PS) and polypropylene homopolymer (PPH). Collard et al. [33] have found that maximum particles found in their studies were polypropylene, polystyrene and polyethylene.

## 4. Conclusion

This study demonstrates the widespread presence of microplastics in commercial poultry feeds and edible tissues (breast, liver, gizzard) of chickens in the Rajshahi region. The higher abundance of microplastics in gizzards compared to other tissues suggests retention and accumulation in the gastrointestinal tract. Feed samples also contained substantial levels of microplastics, indicating that feed is a major pathway for microplastic ingestion. Fibre-type particles were dominant in both the feed and chicken meat samples based on the shape and geometry of the ingested particles. Collected particles were of six colors (red, blue, green, yellow, violet, transparent), wherein the most particles were red and transparent obtained from feed and chicken meat samples, respectively. Polymer identification confirmed the presence of common plastic types including PET (Polyethylene Terephthalate), PE (Polyethylene), and PP (Polypropylene). The findings of this study shows that the possible route of the microplastic particles ingested by the chickens are the feeds given and the environment of the farm. It also shows how the chickens that we are consuming as a source of protein is highly contaminated with microplastic particles and could be a potential risk for human health. These findings underscore an emerging environmental and food-safety concern for Bangladesh and highlight the necessity of establishing monitoring frameworks, improving feed processing practices, and conducting further studies on toxicological impacts on poultry and humans.

### Author contributions

Mahadia Faiza Shifa: Conceptualization; methodology; investigation; sample collection; sample analysis, data curation; data analysis; software computation; writing-original draft. Md Golam Mostafa: Conceptualization; methodology; investigation; validation; software; supervision; writing-

review & editing. All authors have read and agreed with the published version of the manuscript.

## Ethical approval

Ethical approval was not required for this study because it did not involve human participants or live animals. The chickens were purchased from farms, and different body parts were analyzed after slaughter.

## Conflicts of Interest

The authors report no conflicts of interest.

## Acknowledgment

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## Data availability statement

All data generated or analyzed during this study were included in this article. All the raw and analyzed data will be available from the corresponding author based on reasonable demand.

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