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# DIVERSITY OF INSECT PESTS IN THE BRINJAL FIELD DURING THE SUMMER SEASON

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## ABSTRACT

A study was conducted to know the prevalence, abundance and diversity of insect pests in the brinjal field at Babugonj, Barisal during May to September 2024. Eleven insect pests namely brinjal mealy bug, *Coccidohystrix insolita* Green (Margarodidae: Hemiptera); cotton aphid, *Aphis gossypii* Glover (Aphididae: Hemiptera); green leafhopper, *Amrasca biguttula biguttula* Ishida (Cicadellidae: Hemiptera); whitefly, *Bemisia tabaci* Gennadius (Aleyrodidae: Hemiptera); plant hopper, *Siphanta acuta* Walker (Flatidae: Hemiptera); squash bug, *Anasa tristis* De Geer (Coreidae: Hemiptera); epilachna beetle, *Henosepilachna vigintioctopunctata* Fabricius (Coccinellidae: Coleoptera); leaf beetle, *Monolepta signata* Olivier (Chrysomelidae: Coleoptera); flea beetle, *Phyllotreta cruciferae* Goeze (Chrysomelidae: Coleoptera); brinjal shoot and fruit borer, *Leucinodes orbonalis* Guenée (Pyralidae: Lepidoptera); and cutworm moth, *Agrotis ipsilon* Hufnagel (Noctuidae: Lepidoptera) were recorded in the field. Among the insect pests, cotton aphid (6.93 insects plant$^{-1}$ observation$^{-1}$), green leafhopper (5.60 insects plant$^{-1}$ observation$^{-1}$), mealy bug (5.28 insects plant$^{-1}$ observation$^{-1}$) and whitefly (0.82 insects plant$^{-1}$ observation$^{-1}$) were more abundant while the others were less abundant in the field. The relative abundance of the insect pests was cotton aphid (36.31%) > green leafhopper (29.33%) > mealybug (27.65%) > whitefly (4.29%) > leaf beetle (0.56%) > brinjal shoot and fruit borer (0.49%) > epilachna beetle (0.42%) > flea beetle (0.35%) > plant hopper (0.24%) > squash bug (0.21%) > cutworm moth (0.14%). Among the prevalent 11 insects, 6 insects belong to the order Hemiptera, 3 insects belong to the order Coleoptera and 2 insects belong to the order Lepidoptera. Hemipteran insects belong to the suborder Sternorrhyncha (3), Auchenorrhyncha (2) and Heteroptera (1). All Coleopteran insects belong to Polyphaga and all Lepidopteran insects belong to Heterocera suborder. Therefore, Hemipteran insect of the suborder Sternorrhyncha were most prevalent and abundant in the brinjal field.

***Keywords:*** Brinjal, insect pest diversity, prevalence, abundance, relative abundance

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## INTRODUCTION

Brinjal (*Solanum melongena* Lin.) is a popular vegetable in Bangladesh because of its palatability. In Bangladesh, brinjal is cultivated in 115,000 hectares of land producing 619,000 metric ton fruit with a yield ranging from 20-30 t $ha^{-1}$ (BBS 2023). Brinjal fruit is rich in vitamin, mineral, protein and bioactive compounds including flavonoid, isoflavone, anthocyanin, antioxidant and polyphenol (Agregan *et al.* 2021) like the different cereal grains (Khatun and Mollah 2024) and legume crops including soybean (Khatun and Kim 2021). These bioactive compounds have anti-inflammatory and anti-obesity properties (Khatun *et al.* 2023). In Bangladesh, brinjal is successfully cultivated throughout the country both in the winter and summer season (Mollah 2025, Das *et al.* 2023). However, summer season is most suitable for brinjal cultivation providing sufficient yield (Mollah *et al.* 2023, Mollah *et al.* 2022).

Insect pests are the main constraint against the successful cultivation of brinjal in Bangladesh. Infestation of insects started at the seedling or early vegetative stage and continued up to last harvest of fruit (Latif *et al.* 2010). Brinjal is reported to be infested by many insect pests including brinjal shoot and fruit borer, *Leucinodes orbonalis* G. (Haque 2024); green leafhopper, *Amrasca biguttula biguttula* I. (Mollah 2024); cotton aphid, *Aphis gossypii* G. (Mollah and Khatun 2024); whitefly, *Bemicia tabaci* Genn. (Uddin *et al.* 2025); leaf roller, *Anobata olevacea* (Das *et al.* 2023); epilachna beetle, *Epilachna vigintioctopunctata* Fab. (Khan *et al.* 2023); mealybug, *Coccidohystrix insolita*; leaf beetle, *Monolepta signata* Oliv. and green leafhopper, *Nephotettix virescens* (Ghosh *et al.* 2021).

However, all these insects are not prevalent and abundant in all seasons and in all areas of Bangladesh. For example, brinjal shoot and fruit borer are most prevalent and abundant in the summer season (Mollah *et al.* 2022, Ara *et al.* 2007) compared to the winter season (Das *et al.* 2023). However, brinjal shoot and fruit borer are prevalent and abundant as major pest both in winter and summer season in Jashore region (Ghosh *et al.* 2021) and Dhaka (Ghosh *et al.* 2022) but as minor pest in Sylhet (Das *et al.* 2023). The sucking pests including aphid and green leafhopper are more prevalent and abundant in the winter season (Mollah and Khatun 2024, Mollah 2024, Ghosh *et al.* 2021) than the summer season (Kadgonkar *et al.* 2018). Mealybug appeared as a major pest in the summer season in the coastal area of Bangladesh

(Khan 2020) while in winter as minor pest in Dhaka (Ghosh *et al.* 2022). Very few or no information on the diversity of insect pests in the Brinjal field of Barisal is available. Therefore, the present study aimed to know the variation in prevalence and abundance of insect pests in brinjal field of Barisal during summer season.

## MATERIALS AND METHODS

This study was conducted at Bangladesh Institute of Nuclear Agriculture (BINA), Barisal during May to September 2024. This area is situated at the latitude of 22.8162 $^{o}$N and longitude of 90.3137$^{o}$E with an elevation of 2 meters from the sea level (Khatun *et al.* 2025). The study area is under the Agro-Ecological Zone of Active Ganges Floodplain (AEZ 10) with calcareous brown floodplain soil characterized by low organic matter and nitrogen content (Khatun and Mollah 2023). The experimental field was prepared well following the agronomic practices. One-month aged seedlings were planted in the field keeping 80 cm distance. The experiment was laid out in randomized complete block design (RCBD) with three replications. Total number of brinjal seedling transplanted in the field were thirty (30). Irrigation, weeding, mulching, fertilization and other intercultural operations were carried out as needed. After ten days of seedling transplanting, data collection on insect pest prevalence and abundance were started. Data on the prevalence of insect was recorded by visual search following Mollah *et al.* (2017). For this, all the leaves of all the plants were checked regularly once a week and the prevalent insect pests were recorded. Picture of the leaves infested by the specific pests were also collected for pictorial representation and validation. For the abundance of insect pests, number of the specific insect pests in the infested leaves or infested plants were recorded. During the process of data collection, the unknown insects were collected in the 15 ml falcon tube and brought to the laboratory for detailed study on their morphological characteristics. Identification of the collected insects were performed by matching with pictures, literature study or taking help from the experts. The collected data were inputted and analysed using Microsoft excel and graphically presented with sigma plot 12.5 software. Pictorial representation of the insect pests was carried out using the Microsoft PowerPoint software. Relative abundance of the insect pests was determined following Mollah and Rahman (2012):

$$\text{Relative abundance (\%) of insect pests} = \frac{\text{Number of specific insect pest}}{\text{Total number of insect pests}} \times 100$$

## RESULTS

**Prevalence of insect pests in the brinjal plant:** Eleven insect pests were found in the brinjal field during summer season (Fig. 1). The prevalent insect pests were: brinjal mealybug, green leafhopper, cotton aphid, epilachna beetle, brinjal shoot and fruit borer, leaf beetle, flea beetle, plant hopper, whitefly, cutworm moth and squash bug (Fig. 1). Among these insect pests, mealybug, epilachna beetle and brinjal shoot and fruit borer were recorded from both leaf and fruits (Fig. 1).

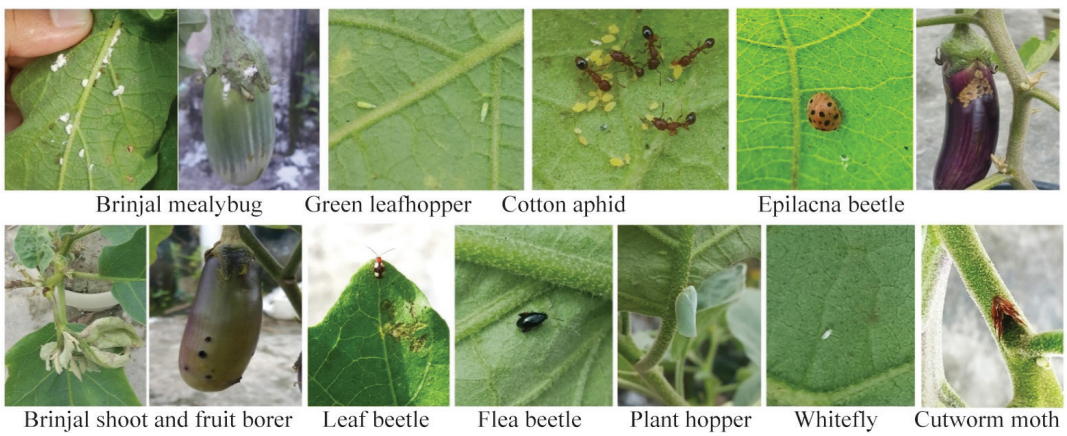


**Fig. 1.** Pictorial representation of insect pests infesting brinjal plant and fruit.

**Taxonomic status of the prevalent insect pests:** Among the insect pests, mealybug (*Coccidohystrix insolita* Green), cotton aphid (*Aphis gossypii* Glover) and whitefly (*Bemisia tabaci* Gennadius) belongs to the family Margarodidae, Aphididae and Aleyrodidae, respectively (Table 1). All these three families belong to the suborder Sternorrhyncha. Green leafhopper (*Amrasca biguttula biguttula* Ishida) and planthopper (Siphanta acuta Walker) belongs to the family Cicadellidae and Flatidae, respectively. These two families belong to the suborder Auchenorrhyncha (Table 1). Squash bug (*Anasa tristis* De Geer) belongs to the family Coreidae under the suborder Heteroptera (Table 1). The suborders Sternorrhyncha, Auchenorrhyncha and Heteroptera belongs to the order Hemiptera

(Table 1). Epilachna beetle (*Henosepilachna vigintioctopunctata* Fabricius) belongs to the family Coccinellidae (Table 1). Leaf beetle (*Monolepta signata* Olivier) and Flea beetle (*Phyllotreta cruciferae* Goeze) belongs to the family Chrysomelidae (Table 1). Both Coccinellidae and Chrysomelidae family belongs to the suborder Polyphaga under the order Coleoptera. Brinjal shoot and fruit borer (*Leucinodes orbonalis* Guenée) and Cutworm moth (*Agrotis ipsilon* Hufnagel) belongs to the family Pyralidae and Noctuidae, respectively (Table 1). These two families belong to Heterocera suborder of the order Lepidoptera (Table 1). So, eleven brinjal pests belongs to ten families, five suborders and three orders (Table 1).

**Table 1.** Taxonomic identity of the prevalent insect pests.

| Common name | Scientific name | Family | Suborder | Order |
|---|---|---|---|---|
| Brinjal mealybug | *Coccidohystrix insolita* Green | Margarodidae | Sternorrhyncha | Hemiptera |
| Cotton aphid | *Aphis gossypii* Glover | Aphididae | | |
| Whitefly | *Bemisia tabac*i Gennadius | Aleyrodidae | | |
| Green leafhopper | *Amrasca biguttula biguttula* Ishida | Cicadellidae | Auchenorrhyncha | |
| Planthopper | *Siphanta acuta* Walker | Flatidae | | |
| Squash bug | *Anasa tristi*s De Geer | Coreidae | Heteroptera | |
| Epilachna beetle | *Henosepilachna vigintioctopunctata* Fabricius | Coccinellidae | Polyphaga | Coleoptera |
| Leaf beetle | *Monolepta signata* Olivier | Chrysomelidae | | |
| Flea beetle | *Phyllotreta cruciferae* Goeze | | | |
| Brinjal shoot and fruit borer | *Leucinodes orbonalis* Guenée | Pyralidae | Heterocera | Lepidoptera |
| Cutworm moth | *Agrotis ipsilon* Hufnagel | Noctuidae | | |

**Abundance of the insect pests:** Number of insects were variable in the field. Field observations revealed that cotton aphid (208) was most abundant which was followed by green leafhopper (168), mealybug (158.4) and whitefly (24.6) while cutworm moth (0.8) was least abundant followed by squash bug (1.2), plant hopper (1.4), flea beetle (2), epilachna beetle (2.4), brinjal shoot and fruit borer (2.8) and leaf beetle (3.2) (Fig. 2).

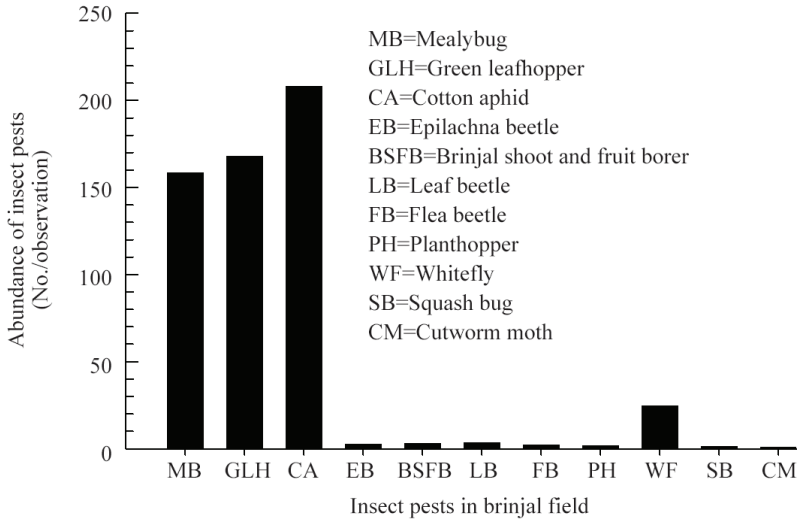


**Fig. 2.** Abundance of insect pests in the brinjal field. The number represent insect pests from each observation conducted in 30 plants.

Considering the number of insect pest plant$^{-1}$ observation$^{-1}$, cotton aphid (6.93 insect plant$^{-1}$ observation$^{-1}$) was most abundant which was followed by green leafhopper (5.6 insect plant$^{-1}$ observation$^{-1}$), mealybug (5.28 insect plant$^{-1}$ observation$^{-1}$) and whitefly (0.82 insect plant$^{-1}$ observation$^{-1}$) among the major insect pests (Fig. 3).

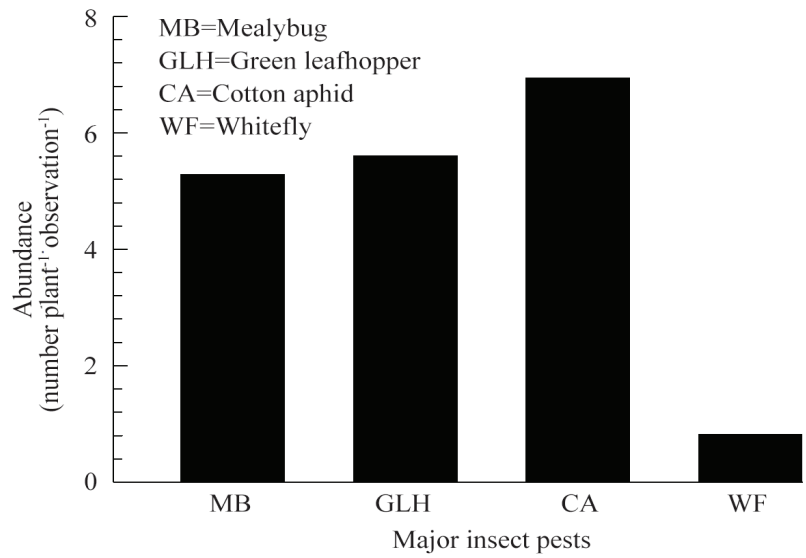


**Fig. 3.** Abundance (number plant$^{-1}$ observation$^{-1}$) of major insect pests in the brinjal plants.

Among the minor pests, cutworm was least abundant (0.027 insect plant$^{-1}$ observation$^{-1}$) which was followed by squash bug (0.04 insect plant$^{-1}$ observation$^{-1}$), plant hopper (0.047 insect plant$^{-1}$ observation$^{-1}$), flea beetle (0.067 insect plant$^{-1}$ observation$^{-1}$), epilachna beetle (0.08 insect plant$^{-1}$ observation$^{-1}$), brinjal shoot and fruit borer (0.093 insect plant$^{-1}$ observation$^{-1}$) and leaf beetle (0.107 insect plant$^{-1}$ observation$^{-1}$) (Fig. 4). Therefore, cotton aphid, green leafhopper, mealybug and whitefly can be considered as major pest and epilachna beetle, brinjal shoot and fruit borer, leaf beetle, flea beetle, plant hopper, squash bug and cutworm moth can be treated as minor pests.

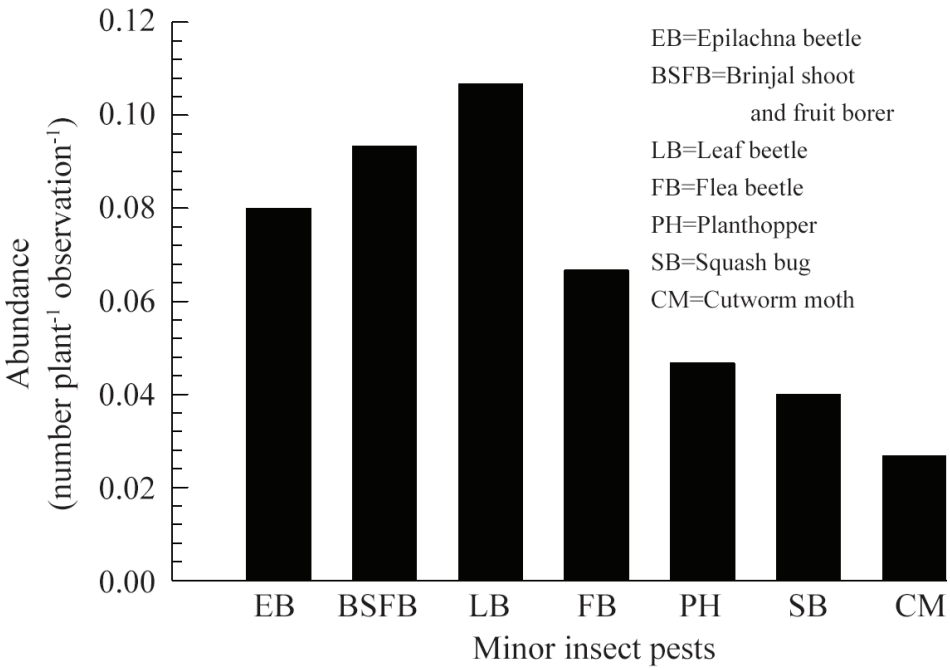


**Fig. 4.** Abundance (number/plant/observation) of minor insect pests in the brinjal plants.

**Relative abundance of insect pests in the field:** From the prevalent insect pests, relative abundance (%) was determined. Maximum relative abundance was recorded for cotton aphid (36.31%) which was followed by green leafhopper (29.33%), mealybug (27.65%), whitefly (4.29%), leaf beetle (0.56%), brinjal shoot and fruit borer (0.49%), epilachna beetle (0.42%), flea beetle (0.35%), plant hopper (0.24%), squash bug (0.21%) and cutworm moth (.14%) (Fig. 5). So, based on the abundance,

the insect pests can be arranged as cotton aphid > green leafhopper > mealybug > whitefly > leaf beetle > brinjal shoot and fruit borer > epilachna beetle > flea beetle > plant hopper > squash bug > cutworm moth.

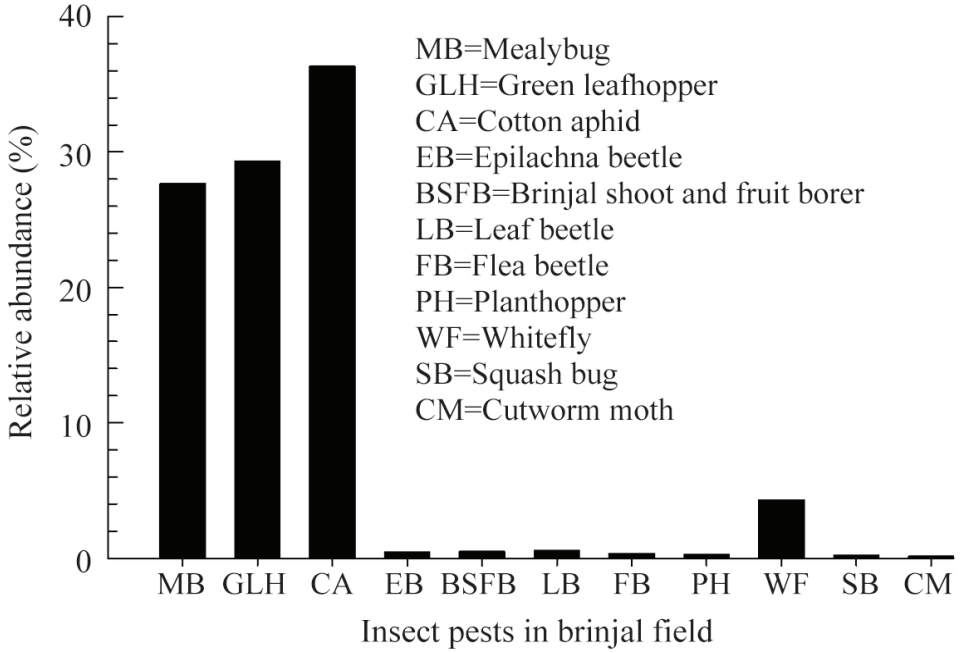


**Fig. 5.** Relative abundance (%) of insect pests in the brinjal field.

## DISCUSSION

This study was conducted during May to September 2024 at Babugonj of Barisal district and recorded 11 insect pests from brinjal field. Among these, cotton aphid (6.93 insects plant$^{-1}$ observation$^{-1}$), green leafhopper (5.60 insect plant$^{-1}$ observation$^{-1}$), mealybug (5.28 insects plant$^{-1}$ observation$^{-1}$) and whitefly (0.82 insect plant$^{-1}$ observation$^{-1}$) were major while epilachna beetle (0.08 insect plant$^{-1}$ observation$^{-1}$), brinjal shoot and fruit borer (0.093 inset plant$^{-1}$ observation$^{-1}$), leaf beetle (0.11 insect plant$^{-1}$ observation$^{-1}$), flea beetle (0.07 insect plant$^{-1}$ observation$^{-1}$), plant hopper (0.05 insect plant$^{-1}$ observation$^{-1}$), squash bug (0.04 insect plant$^{-1}$ observation$^{-1}$) and cutworm moth (0.03 insect plant$^{-1}$ observation$^{-1}$) were minor. However, green

leafhopper and whitefly were also recorded in dwarf bean field in this area during summer season (Mollah and Khatun 2026).

Ghosh *et al.* (2022) conducted research at Sher-e-Bangla Agricultural University, Dhaka during November 2018 to April 2019 and recorded 7 insect pests of which brinjal shoot and fruit borer, epilachna beetle, whitefly, aphid and jassid were major insect pests but mealy bug and green leafhopper was minor insect pests. Das *et al.* (2023) conducted a study at Sylhet during October 2019 to March 2020 and recorded 6 insect pests and their relative abundance was: aphid > epilachna beetle > leaf roller > jassid > whitefly > brinjal shoot and fruit borer.

Another study at Jashore conducting during November 2018 to April 2019 reported 9 insect pests in the brinjal field of which brinjal shoot and fruit borer, epilachna beetle and jassid were major insect pests while whitefly, aphid, mealybug, green leafhopper, leaf roller and leaf beetle were minor insect pests (Ghosh *et al.* 2021). From the above information, it can be concluded that brinjal shoot and fruit borer, aphid, jassid/green leafhopper, whitefly and epilachna beetle were common in all locality and season although the level of abundance and severity varied among them. However, mealybug appeared as a major insect pest in summer season only in Barisal while infestation of brinjal shoot and fruit borer was relatively less in Barisal compared to Jashore and Dhaka.

**Authorship contribution statement:** Md. Mahi Imam Mollah: Conceptualization, Methodology, Funding acquisition, Investigation, Project administration, Supervision, Validation, Visualization, Software, Resources, Data curation, Formal analysis, Writing – original draft, Writing – review & editing, Soyema Khatun: Software, Resources, Data curation, Formal analysis, Writing – review & editing.

**Declaration of competing interest:** The authors declare no known competing financial or any other interest that could influence the work reported in this paper.

**Data availability:** Data have been presented in the manuscript.

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