ISSN 2313-4941

Volume 10 Number 1 January 2022

The Journal of Ad-din Women's Medical College

The Journal of Ad-din Women's Medical College

Volume 10, Number 1, January 2022

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An official organ of Ad-din Women's Medical College

The Journal of Ad-din Women's Medical College

Volume 10, Number 1, January 2022

Published by : **Prof. Dr. Ashraf-Uz-Zaman**
Principal, Ad-din Women's Medical College
2 Bara Moghbazar, Dhaka-1217, Phone : +880-2-49362921, 49362926
Fax: 8317307, E-mail: awmc@ad-din.org, Website: www.ad-din.org

Printed by : **Asian Colour Printing**
130, DIT Extension Road, Fakirerpool, Dhaka, Bangladesh
Phone : 58313186, 8362258, E-mail : asianclr@gmail.com

ISN : 2313-4941

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Editorial

Heated Humidified High Flow Nasal Cannula (HHHFNC): A non-invasive respiratory support in Neonates

Dr. Sabina Yasmin

Current practice in neonatology is directed toward the preference of noninvasive ventilation and limitation of oxygen exposure. Early use of nasal CPAP either immediately or after surfactant administration (INSURE strategy: intubation, surfactant, extubation) has thus been strongly recommended through the last 2 decades.[1, 2]

High-flow nasal cannula (HFNC) was introduced through the last decade in adult, pediatric, and perinatal care as an alternative to other noninvasive ventilatory interfaces. Its goal is to optimize spontaneous breathing through the reduction of dead space and the creation of positive distending airway pressure. High flow nasal cannula (HFNC) oxygen delivery, also sometimes called heated humidified high flow nasal cannula (HHHFNC), is a relatively new non-invasive respiratory support (NIRS) therapy that seems to be well tolerated in neonates with hypoxemic respiratory failure [3,4].

Earlier, the introduction of traditional HFNC had a maximum flow of 0.5–1 L/min for delivery of oxygen by nasal cannula was set in newborns, [4,5] where a maximum flow at 2 L/min was used for older children and adults in order to prevent drying and discomfort of nasal mucosa and other nasal mucosal complications.[6]

In the Cochrane Review from 2014, HHHFNC in children was defined as heated, humidified and blended air/oxygen delivered via nasal cannula at different flow rate >2 L/min delivering both light concentrations of oxygen and potentially continuous distending process.[7]

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Received Date : 20 December, 2021
Accepted Date : 25 January, 2022

Heated Humidified High Flow Nasal Cannula (HHHFNC):

In adults and children, the role of **HHHFNC** mainly remains for optimization of oxygen delivery, the impact of high flow in neonates and infants is, more importantly, the created PEEP, like CPAP.[6] Major indications for HHHFNC in neonates are thus the same as for nasal CPAP: respiratory distress syndrome, post extubation, and apnea of prematurity.[8] Among the various causes of neonatal intensive care unit (NICU) admission in infants, respiratory distress remains the most common one.[9]

However, according to US consortium on safe labor, approximately 15% of term neonates and 34% of late preterm infants require NICU admission after birth due to significant respiratory problems; this is even higher for preterm infants born before 34 weeks of gestation.[10] Respiratory distress syndrome (RDS) is by far the most common cause of respiratory distress in preterm infants (50.8%), followed by transient tachypnea of the newborn (4.3%) and pneumonia/sepsis 13 (1.9%).[11]

There has been an increased use of nasal continuous positive airway pressure (CPAP), and avoidance of intubation and mechanical ventilation due to its complications, as a primary mode of the treatment for respiratory distress in neonates.[12]

Further, the use of nasal CPAP (NCPAP) in neonates is also associated with some problems such as difficulty in maintaining the nasal prongs in the nostrils, difficulty in positioning the neonate, poor tolerance of the infant to the apparatus, and nasal trauma (ulceration, necrosis, and nasal vestibular stenosis).[13]

To avoid these problems with NCPAP, a newer modality is being used in the NICUs across the world, the use of heated and humidified HFNC to provide positive pressure support in infants with respiratory distress.[14]

HHHFNC has many effects on respiratory mechanics, by which it improves clinical outcomes such as washout of anatomic dead space and improved gas mixing in large airways; heating and humidification of inhaled gas; high nasal inspiratory flow; generation of positive airway pressure that results in increased endexpiratory lung volume; and increased alveolar PO_2.

Recent advances in HHHFNC usage including enhanced humidity and improved comfort factors have led to its widespread use, at times replacing nCPAP in many neonatal settings. Diverse research work was done related to safety & efficacy of HHHFNC with comparison to nCPAP in different countries but there is limited data of such type study in Bangladesh. An open, randomized, controlled trial was done at Dhaka Hospital, International Centre for Diarrheal Disease Research, Bangladesh. [15] Children younger than 5 years with severe pneumonia and hypoxemia receive oxygen therapy by either bubble CPAP (5 L/min starting at a CPAP level of 5 cm H2O), standard low-flow nasal cannula (90% on room air). HFNC had an increased risk of treatment failure compared with nCPAP in infants age 1-6 months with severe hypoxemia (SpO2 90% on supplemental oxygen. No significant differences were found in intubation rates and mortality between HFNC and standard oxygen therapy or nCPAP. HFNC had a lower risk of nasal trauma compared with nCPAP.[16]

In India, one randomized controlled trial in Jaipur, described that HHHFNC is equally efficacious to NCPAP as a primary mode of respiratory support for mild-to-moderate respiratory distress in preterm infants. Furthermore, HHHFNC is safer modality than NCPAP in terms of nasal trauma. Hence, HHHFNC can be used as a primary modality to treat preterm infants with mild-to-moderate respiratory distress.[17] Moreover, a Literature review, two reports (2016) described four serious cases of pneumothorax in children on HFNC; one 2 month old child treated for RSV bronchiolitis. Three studies have reported abdominal distension in children on HFNC, indicating that one should be careful with HFNC in children with intra-abdominal pathology. Mucosal injury with nasal bleeding and ulceration has 15 been reported in children on HFNC but in a randomized control trail including preterm infants below 32 weeks, nasal trauma was less frequent in the HFNC group than in the CPAP group.[18]

Further, in another meta-analysis based on clinical trials compared efficacy and safety of high-flow nasal cannula (HFNC) with continuous positive airway pressure (CPAP) as primary respiratory support in preterm infants she yielding the impact of clinical relevant parameters. Methods were searched for randomized controlled trials comparing HHHFNC with CPAP as primary respiratory support in preterm infants. The authors commented that the treatment failure was considered as primary outcome including some adverse events as secondary outcomes. They concluded that Despite a higher risk of treatment failure, considering no difference in intubation rates and a lower rate of nasal trauma using HHHFNC compared with CPAP, suggest that HHHFNC should be used as primary respiratory support in preterm infants.[19,20]

Bottom-line:

Until more evidence is available, HFNC may be used as a supplementary form of respiratory support in neonates, but with a critical approach regarding effective clinical responses and safety issues relating to early recognition of treatment failure, particularly when neonates are managed on HFNC outside of a Neonatal intensive care unit.

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Original Article

Antibacterial Effect of Aqueous and Methanolic extract of Indian bay leaves *(Cinnamomum tamala)* against *Pseudomonas aeruginosa*

*Shompa Sharmin Rasna[1], Sanjoy Saha[2], Sharrmin Jahan[3], Md. Abu Taleb[4], Sanjida Sultana[5], Mahmuda Aktar[6]

Abstract

Objective: To investigate the antibacterial activities of Indian bay leaf extracts against Pseudomonas aeruginosa.

Methods: This Experimental study was carried out during the period of July 2019 to June 2020 in the Department of Pharmacology and Therapeutics with the collaboration of Department of Microbiology, Mymensingh Medical College, Mymensingh, Bangladesh. The antibacterial activity was tested at different concentrations (20, 10, 5,2.5, 1.25 & 0.625 mg/ml) of both extracts of spice by using disc diffusion & broth dilution method. The extracts were prepared by using solvents aqueous & methanol. The test microorganisms were also tested for their activity against a standard antibiotic Gentamicin (80 mg) by broth dilution method and the result was compared with that of Aqueous and Methanolic extracts.

Results: Among different concentrations of the ALE, 15mg/ml & above concentration showed inhibitory effect against *Pseudomonas aeruginosa.* In case of MLE, 15mg/ml & above concentration showed inhibitory effect against aforesaid bacteria. In disc diffusion method, Zone of inhibition (ZOI) in case of ALE ranged between 6-25mm at different concentration of extracts. Minimum inhibitory concentrations (MIC) of ALE were 15 mg/ml and MLE were 7.5 mg/ml against *Pseudomonas aeruginosa.* This result was also compared against a standard antibiotic Gentamicin where the MICs of Gentamicin were lower in comparison to MICs of ALE & MLE. The present study showed that aqueous and methanolic extracts of leaves demonstrated antibacterial effects against *Pseudomonas aeruginosa.*

Conclusion: From the study it is clearly observed that there is definite antibacterial effect of both the aqueous and methanolic extract of leaves of Cinnamomum tamala against *Pseudomonas aeruginosa.* Further studies are required to detect and isolate the biologically active ingredients present in the Cinnamomum tamala which are responsible for this antibacterial effect. Hopefully, that would lead to the discovery of new and more potent antimicrobial agents isolated from Cinnamomum tamala.

Key words: Antibacterial activity, Cinamomum tamala, *Pseudomonas aeruginosa*, Zone of Inhibition, Minimum

Introduction

Infectious diseases are the leading cause of premature death and kill about 50000 people every day in the world. In recent years, drug resistant pathogenic bacteria have been commonly reported from around the world due to indiscriminate use of antibiotics and anxious situation encourages the development of potent antimicrobial agents.[1] Thus, global attention has been shifted to the search for new chemicals, specifically herbals, for the development of new drugs. Many methods have been used to obtain compounds for drug discovery, including isolation from plants and other natural sources, synthetic chemistry, combinatorial chemistry and molecular modeling.[2]

The spice plant Cinnamomum tamala commonly known as tejpata, belongs to the family Lauraceae, which is native to India, Nepal, Bhutan, Bangladesh. The used parts are leaves, bark and essential oil. Bay leaves are a moderate sized evergreen tree with a height of 8m and a girth of 50 cm. Leaves are lanceolate, glabrous, alternately placed, opposite and short stalked.[3] nerved from the base. The genus Cinnamomum has about 250

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Received Date : 20 December, 2021
Accepted Date : 25 January, 2022

tropical tree and shrub species. The etymology is derived from the Greek word Kinnamomon (meaning spice). The Greeks borrowed the word from the Phoenicians, indicating that they traded with the east from early times. The specific epithet 'tamala' is after a local name of the plant in india.[3,4,5] Bay laurel leaves are short and light to medium green in color, with one large vein below the length of the leaf, while the leaves of the indian bay leaf are about twice as long and broad, usually olive green in color, and with three veins down the length of the leaf.[6] Dried leaves of Cinnamomum tamala are used to flavor a variety of foods. Plant bark and leaves are good source of aromatic essential oil which possess phenolic compounds which show multiple therapeutic effects against Alzheimer'sdisease, diabetes, arthritis and arteriosclerosis.[7] The leaves of the tree are rich in manganese, iron, dietary fiber and calcium. Dried leaves and bark are prescribed for fever, anemia and body odor. People chew dried leaves to get rid of bad breath. Cinnamomum tamala leaves have a strong effect on the biological systems such as immune system, gastro intestinal tract and liver.[8] C.tamala show strong antimicrobial activity against gram-positive bacteria, gram-negative bacteria, and fungi. Oil and its ingredients show strong antimicrobial activity against methicillin-resistant *Staphylococcus aureus, Pseudomonas aeruginosa, Bacillus subtilis, Helicobacter pylori, Aspergillus fumigatus*. Essential oil showed growth inhibitory effects against *S.aureus* and *Mycobacterium tuberculosis, Escherichia coli*.[9]

Its various activities have a very promising role. Therefore, the aim of the present study is to evaluate the antibacterial effects of Aqueous and Methanolic extract of leaves of Indian bay leaf against *Pseudomonas aeruginosa*. This study may be helpful in emphasizing the importance of Indian bay leaf as natural product for controlling drug resistant bacteria which is a major threat to human health and also to compare its sensitivity with commercial antibiotics against bacterial species.

Methods

This Experimental study was carried out in the Department of Pharmacology & Therapeutics in collaboration with the Department of Microbiology, Mymensingh Medical College, Mymensingh, Bangladesh from July 2019 to June 2020.

Tested bacterial strains: Bacterial strains, *Pseudomonas aeruginosa* (ATCC 27853) were used in study. Pure cultures of these were obtained from the Department of Microbiology, Mymensingh Medical College, Mymensingh.

Maintenance of bacterial culture and inoculum preparation: Pure cultures were refreshed and maintained on nutrient agar slants and plates on regular basis. The cultures were streaked on sterile nutrient agar plates and kept in incubator for 24 hours at 37°C and stored at 4 °C. Bacterial cultures were refreshed after every 1 to 2 weeks to avoid contamination. Inoculum was prepared by growing the pure bacterial culture in nutrient broth over night at 37°C.

Plant material: The fresh tender leaves were purchased from rural area of Mymensingh.

Preparation of aqueous leaves extract:
The leaves were washed and dried in shade under room temperature for six to seven days. Finaly dried materials were pulverized into fine powdered substance by a grinder. 50 gm of powder of indian bay leaves were weighed with the electric balance and transferred into one conical flask. Then 500 ml distilled water in the flask was added. The solution was kept at room temperature for at least 24 hr. The aqueous extract was then filtered by using muslin cloth. The filtrate was again filtered using whatman no.1 filter paper under strict aseptic conditions. The resulting filtrate were collected in previously tared sterilized petriplates and dried in rotary flash evaporator at 45°C for proper dehydration. After the complete removal of the solvent, the petriplates were weighed and then the net weight of dried extract was determined and used. 1gm dried extract was then dissolved in 50ml sterilized distilled water.

For preparation of aqueous stock solution, 1gm of ALE was dissolved in 50 ml of D/W to get a concentration of .02 gm/ml i.e 20mg/ml which as labeled as stock solution. From above stock solution different concentration such as 10mg/ml, 5mg/ml, 2.5mg/ml, 1.25mg/ml, 0.625mg/ml were prepared with appropriate volumes of D/W.

Table I: *Preparation of the ALE solutions of different concentration*

Sl. No.	Amount of solution (ml) taken from Stock Solution	Amount of distilled water (ml)	Concentration (milligram /ml)
1	1	31	0.625
2	1	15	1.25
3	1	7	2.5
4	1	3	5
5	1	1	10
6	1	0	20

Preparation of methanolic leaves extract:
The leaves were washed and dried in shade under room temperature for six to seven days. Finaly dried materials were pulverized into fine powdered substance by a grinder. 50 gm of powder of indian bay leaves were weighed with the electric balance and transferred into one conical flask. Then 500 ml 100% Methanol in the flask was added. The solution was kept at room temperature for at least 24 hr. The methanolic extract was then filtered by using muslin cloth. The filtrate again filtered using whatman no.1 filter paper under strict aseptic conditions. The resulting filtrate were collected in previously tared sterilized petriplates and dried in rotary flash evaporator at 45°C for proper dehydration. After the complete removal of the solvent, the petriplates were weighed and then the net weight of dried extract was determined and used. 1gm dried extract was then dissolved in 50ml sterilized distilled water.

For preparation of methanolic stock solution, 1gm of MLE was dissolved in 50 ml of D/W to get a concentration of .02 gm/ml i.e 20mg/ml which as labeled as stock solution. From above stock solution different concentration such as 10mg/ml, 5mg/ml, 2.5mg/ml, 1.25mg/ml, 0.625mg/ml were prepared with appropriate volumes methanol.

***Antibacterial sensitivity testing using disc diffusion method*:** Antibacterial sensitivity test was performed by Kirby-Bauer disc diffusion technique. Filter paper disc of 6mm diameter using Whatman No.1 filter paper was prepared and sterilized. After matching with 0.5 McFarland standards for each isolate, a sterile cotton swab was dipped into bacterial suspension and streaked in three directions on the surface of Mueller Hinton Agar plates and then left for 5-10 minutes in room temperature. The blank discs were aseptically placed over the Mueller Hinton agar plates seeded with the test microorganisms. Then with the help of micropipette 10µl 20mg/ml, 10mg/ml, 5mg/ml, 2.5mg/ml, 1.25mg/ml and 0.625mg/ml concentrations of Aqueous & methanolic leaf Extracts were transferred to different disc aseptically. while 10µL of distilled water & 100% methanol were added in sterile filter paper disc as negative control in both extracts. Plates were incubated at 37°C for 24 hours. After 24 hours the results were recorded. The antibacterial activity results were expressed in term of

Table II: Preparation of the MLE solutions of different concentration

Sl. No	Amount of solution (ml) taken from stock solution	Amount of distilled water (ml)	Concentration (milligram /ml)
1	1	31	0.625
2	1	15	1.25
3	1	7	2.5
4	1	3	5
5	1	1	10
6	1	00	20

the diameter of zone of inhibition and <9mm zone was considered as inactive; 9-12mm as partially active; while 13-18mm as active and >18mm as very active as described in Gupta et al[10].

Determination of minimum inhibitory concentration (MIC) of Cinnamomum tamala leaves extract against test bacteria by broth dilution method.

Preparation of ALE stock & working solutions: As described before, 1gm Aqueous extracts powder was dissolve in 50 ml D/W in which 1 ml of solution contained .02 gm or 20 mg of ALE powder and it was stock solution used to prepare ALE working solutions. **Sets-I, II, III, IV, V, VI and VII** respectively were made in different test tubes by mixing measured amount of ALE stock solution with measured amount of nutrient broth medium. The concentrations of these sets were 15mg/ml, 10mg/ml, 7.5mg/ml, 5mg/ml, 2.5mg/ml, 1.25mg/ml and 0.625mg/ml ALE respectively. **Set-VIII (Control-1)** was made with ALE stock solution. **Set-IX (Control-2)** was made with nutrient broth medium. **Set-X (Control-3)** was made with nutrient broth medium in test tubes.

Inoculation of bacterial suspension to working solutions of ALE & MLE in test tubes

After matching the turbidity of bacterial suspension with 0.5 McFarland standards, 20µl of bacterial suspension of *P. aeruginosa* were separately added to each concentration of working solutions of ALE & MLE in separate test tubes. These inoculums were also added to the Control-1 & 2, but not to Control-3. These were Incubated at 37°C for 18-24 hours.

Table III: Composition and different concentrations of working ALE solutions and the controls

No. of Sets	ALE Solution (ml)	Nutrient broth medium (ml)	Total (ml)	Concentration of ALE (mg/ml)	Test Organism (µl)
Set- I	7.5	2.5	10	15	20
Set- II	5	5	10	10	20
Set- III	3.75	6.25	10	7.5	20
Set- IV	2.5	7.5	10	5	20
Set- V	1.25	8.75	10	2.5	20
Set- VI	.625	9.375	10	1.25	20
Set- VII	.3125	9.6875	10	0.625	20
Set- VIII C-1	10	0	10	20	20
Set-IX C-2	-	10	10	-	20
Set-X C-3	-	10	10	-	-

Preparation of MLE stock & working solutions: As described before, stock solution 20 mg/ml. Different sets of working solutions & controls were prepared as described before.

Table IV: Composition and different concentrations of working MLE solutions and the controls

No. of Sets	MLE stock Solution (ml)	Nutrient broth medium (ml)	Total (ml)	Concentration of MLE mg/ml	Test Organism (µl)
Set- I	7.5	2.5	10	15	20
Set- II	5	5	10	10	20
Set- III	3.75	6.25	10	7.5	20
Set- IV	2.5	7.5	10	5	20
Set- V	1.25	8.75	10	2.5	20
Set- VI	.625	9.375	10	1.25	20
Set- VII	.3125	9.6875	10	0.625	20
Set- VIII C-1	10	0	10	20	20
Set-IX C-2	-	10	10	-	20
Set-X C-3	-	10	10	-	-

Table V: Composition and different concentrations of working Gentamicin solutions and the controls

No. of Sets	Gentamicin stock solution-2 (ml)	Nutrient broth Medium (ml)	Total (ml)	Concentration of of Gentamicin (µg/ml)	Test Organism (µl)
Set-I	2	8	10	2	20
Set-II	1.5	8.5	10	1.5	20
Set-III	1	9	10	1	20
Set-IV	0.75	9.25	10	0.75	20
Set-V	0.5	9.5	10	0.5	20
Set-VI	0.25	9.75	10	0.25	20
Set-VII (C-1)	_	10	10	_	20
Set-VIII (C-2)	_	10	10	_	_

Examination of growth of test organisms in different concentrations of ALE & MLE

After 18 to 24 hours of incubation, the growth of test organisms in different preparations of ALE & MLE were examined and compared against that of controls by matching their turbidity. The clear preparations were considered as "No growth" of bacteria and turbid ones, as "Growth of bacteria". The MIC was reported as lowest concentration of ALE & MLE required to prevent the visible growth of test organisms.

Testing antimicrobial activity of a standard antibiotic:

The test microorganisms *P. aeruginosa* was also tested for their activity against the antibiotic Gentamicin (inj. 80mg) by broth dilution method.

Results

In this study Indian bay leaves were found effective against the test bacterial strains. In disc diffusion method, ALE showed varying degrees of antibacterial activity starting from 15mg/ml. *Pseudomonas aeruginosa* was found to be most susceptible to ALE (25mm) at 20mg/ml concentration. In case MLE 15mg/ml and above concentrations showed inhibitory effect against *Pseudomonas aeruginosa*. *Pseudomonas aeruginosa* was found to be most susceptible to MLE (26mm) at 20mg/ml concentration. In Negative control (disc containing only D/W & methanol) showed no activity against any bacteria. The results of leaves extract by broth dilution technique were also compared against a standard antibiotic Gentamicin as shown in figure. By broth dilution technique, the MICs of Aqueous extract of leaves was 15mg/ml, the MIC of Methanolic extract of leaves was 7.5mg/ml. MIC of Gentamicin was 1µg/ml against *P. aeruginosa*. According to CLSI (2016), standard sensitive MICs of Gentamicin for test bacteria were ≤4µg/ml which was consistent with my study results[11].

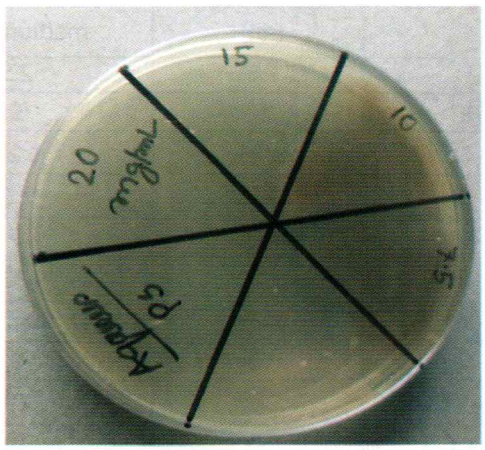

Figure 1: Antibacterial sensitivity testing of ALE against *Pseudomonas aeruginosa*

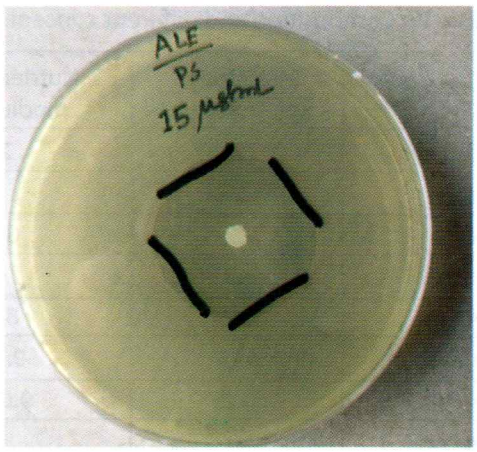

Figure 2: Repeat antibacterial sensitivity testing of ALE against *Pseudomonas aeruginosa.*

Table VI: Antibacterial activity of different concentrations of ALE measured in Zone of Inhibition

Concentrations of ALE solutions in milligram/ml	Zone of Inhibition (ZOI) in mm Pseudomonas aeruginosa
20	25
10	08
5	07
2.5	06
1.25	06
0.625	06
Control	06

Table VII: *Bacterial zone of inhibition at different concentrations of ALE for repeat experiment*

Concentration of ALE in each disc	Zone of Inhibition (expressed in mm) Pseudomonas aeruginosa
15 mg /ml	20

Table VIII: Antibacterial activity of different concentrations of MLE measured in Zone of Inhibition

Concentrations of MLE solutions in milligram /ml	Zone of Inhibition (ZOI) in mm Pseudomonas aeruginosa
20	26
10	09
05	07
2.5	6.5
1.25	06
0.625	06
Control	06

Table IX: Bacterial zone of inhibition at different concentrations of MLE for repeat experiment

Concentration of MLE in each disc	Zone of Inhibition (expressed in mm) Pseudomonas aeruginosa
15 mg/ml	20

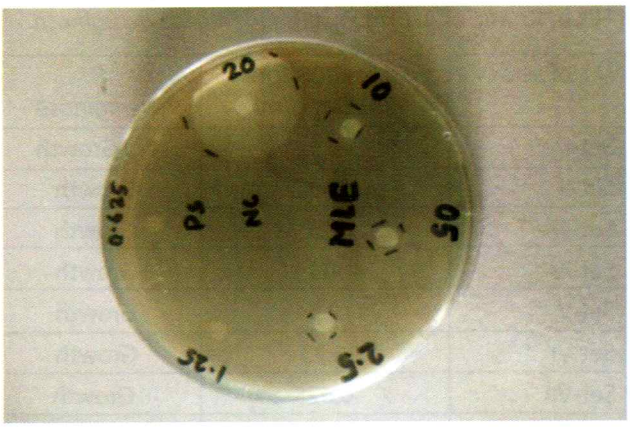

Figure 3: Antibacterial sensitivity testing of MLE against *Pseudomonas aeruginosa*

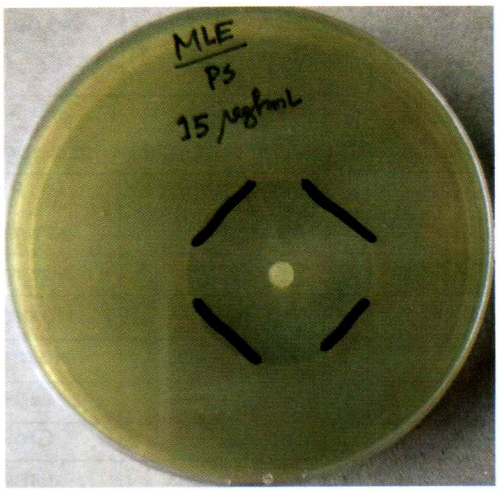

Figure 4: Repeat antibacterial sensitivity testing of MLE against Pseudo*monas aerugi*

Figure 5: *MIC of Methanolic Extract of leaves (MLE)*

Table X: *MIC of ALE against Pseudomonas aeruginosa.*

No. of sets	Concentrations (ALE) mg/ml	*P. aeruginosa*
Set-I	15	No Growth
Set-II	10	Growth
Set-III	7.5	Growth
Set-IV	05	Growth
Set-V	2.5	Growth
Set-VI	1.25	Growth
Set-VII	0.625	Growth
Set-VIII C-1	20	No growth
Set-IX C-2	NB media + Bacteria	Growth
Set-X C-3	NB media+ No Bacteria	No growth

Table XI: *MIC of MLE against Pseudomonas aeruginos*

No. of sets	Concentrations (MLE) mg/ml	*P. aeruginosa*
Set-I	15	No growth
Set-II	10	No growth
Set-III	7.5	No growth
Set-IV	5	Growth
Set-V	2.5	Growth
Set-VI	1.25	Growth
Set-VII	0.625	Growth
Set-VII C-1	20	No growth
Set-IX C-2	NB media + Bacteria	Growth
Set-X C-3	NB media +Bacteria	No growth.

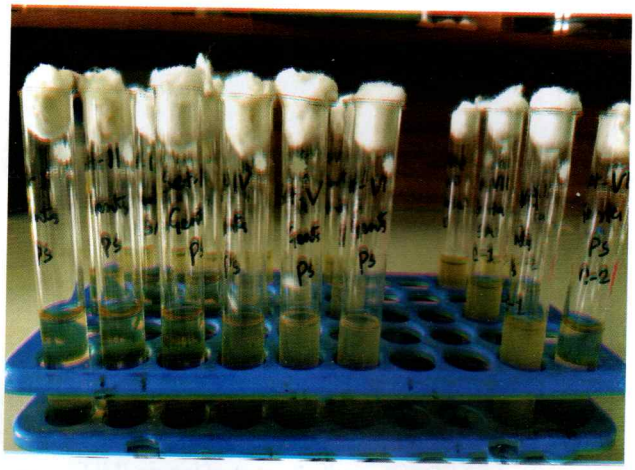

Figure 6: *MIC of Gentamicin*

Discussion

In the present study, in vitro antibacterial activity of ALE and MLE was quantitatively evaluated on the basis of zone of inhibition by disc diffusion method and the MIC was assessed by broth dilution technique. Different concentrations of the extract exhibited varying degrees of inhibitory effect. Several studies have been conducted to evaluate the antibacterial properties of Cinnamomum tamala

A study was carried out by Ajay et al.[12] to assess Antibacterial activity and phytochemical profile of Cinnamomum tamala leaf extracts and oil against different pathogenic bacteria *including S.aureus and P.aeruginosa.* In aqueous extract ZOI of *S.aureus* was 24 mm and *P.aeruginosa* was 25 mm at 5 mg/ml concentration. For *P.aeruginosa*, 25 mm ZOI was seen at 20 mg/ml which is similar with that study. Assessment of Bioactivity of Cinnamomum tamala against pathogenic bacteria including *staphylococcus aureus salmonella typhi, pseudomonas aeruginosa* was tested by Sukumar el at.[13] in agar diffusion method using aqueous and methanolic extract. In aqueous extract highest ZOI for *S.aureus* was 4 mm, for *P.aeruginosa* was 2mm at highest concentration at 5mg/ml. In present study highest ZOI were 18 mm, 25 mm for *P.aeruginosa* respectively at highest concentration at 20 mg/ml. This a bit difference in results may be due to the use of clinical strains of organisms by the researchers.

Anuj et al.[14] investigated the antibacterial activity of Cinnamomum tamala against some bacteria including *S.aureus*, *P.aeruginosa* and some fungal pathogen by disc diffusion method. In Methanolic leaves extract for *P.aeruginosa* ZOI was 9±0.67, 7±1.23, 6±0.25mm at 200 mg/ml, 100 mg/ml, 50 mg/ml concentration respectively. In present study ZOI for *P.aeruginosa* was 9 mm, 7 mm, 6.5 mm at 10 mg/ml, 05 mg/ml, 2.5 mg/ml concentration respectively. This research result is somewhat similar to this result while considering different concentration of the extract.

A study was carried out by Sukumar et al.[13] to assessment of bioactivity of cinnamomum tamala against *S.aureus, S.typhi, P.aeruginosa* and other bacteria by borth dilution method using aqueous and methanolic extract. In aqueous extract, the MIC for *S.aureus* 10 mg/ml, for *S.typhi* MIC was 13 mg/ml and the MIC for *P.aeruginosa* was 13 mg/ml. This result is somewhat similar with my study. In my study, ZOI for *P.aeruginosa* was 15 mg/ml. Another study was carried out by Sukumar et al.[15] to assess the antibacterial activities of

Cinnamomum tamala against *S.aureus, S.typhi, P.aeruginosa* and other bacteria by borth dilution method using aqueous and methanolic extract. In methanolic extract, the MIC for *S.aureus* 2.25 mg/ml, for *S.typhi* MIC was 9 mg/ml and the MIC for *P.aeruginosa* was 9 mg/ml. In present study the MIC for *P.aeruginosa* was 7.5 mg/ml. This finding of present study is somewhat similar with that study.

Conclusion

It is clear that extracts of indian bay leaf have a potential to be developed as a therapeutic agent in preventing bacteria related diseases. Further studies are required to detect and isolate the biologically active ingredients present in the indian bay leaves which are responsible for this antibacterial effect. The practice of using medicinal plants like Indian bay leaf as supplementary or alternative medicine in developing countries will reduce not only the clinical burden of drug resistance development but also the side effects and cost of the treatment as compared to synthetic compounds.

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Original Article

Psychological Distress and Perceived Burden among Parents of Children with Autism Spectrum Disorder: A Cross-Sectional Study

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Abstract

Taking care of children with autism spectrum disorder (ASD) is extremely demanding, both physically and mentally, and can have a negative impact on the family. It takes a lot of time, effort, and patience to meet the extra care needs of the afflicted children. This often causes their parents to experience psychological distress, depression, and other mental health issues. Therefore, we designed the study to investigate the caregiver burden and psychological distress among parents of children with ASD and the associated sociodemographic factors influencing parental burden. This descriptive, cross-sectional study was conducted with parents of 180 children with ASD in three tertiary hospitals in Dhaka, Bangladesh. A pre-validated structured questionnaire was used to collect data, and the caregiver burden was assessed using Zarit Burden Interview and scored to estimate the burden level. The mean age of the children in the sample group was 4.68 ± 0.96 years; 62.8% were boys. Nearly half of the children (46.1%) were diagnosed with ASD in the second year of birth, and comorbidities were present in 31.7%. It was determined that the burden level was significantly higher among mothers of children with ASD than fathers ($p<0.01$). Single parents experienced higher ($p<0.05$) psychological distress than those who were married. Spending long hours on caregiving resulted in poorer caregiving outcomes and increased parenting stress ($p<0.05$). The findings highlight the urgent need for the development of interventions and social support systems to help the parents of children with ASD combat mental health issues.

Keywords: Autism spectrum disorder, Caregiver, Parental burden, Psychological distress, Mental health, Psychological disorders

Introduction

Autism Spectrum Disorder (ASD), one of the most common forms of neurodevelopmental disorder in children, is defined by difficulties in social interaction and communication as well as displays of repetitive behavior.[1,2] Around 1% of the global population is affected by autism spectrum disorder[3], and the prevalence rate has increased dramatically from 1 in 166 children to 1 in 68 in the last few decades, making it a global health crisis.[4] Although it is considered to be caused by a combination of genetic and environmental factors[5], the exact reason for the development of ASD remains elusive. To date, there is no standard treatment available to combat autism, and therefore, extra care is needed for the child with ASD, which in most cases is challenging for the caregiver due to the presence of extensive physical and developmental comorbidities, such as motor deficits, seizure, and delayed self-help skills.[6-8]

Parents are the most crucial element of the family environment as they play a key role in their children's growth.[9] Parents of children with autism shoulder a disproportionate amount of responsibility that comes with caring for people with ASD, such as addressing a child's social, physical, emotional, and educational requirements, which can lead to distress, despair, and anxiety[10-12] Previous studies have reported that caring for children with ASD poses a higher risk of experiencing mental health issues than bringing up children with other disorders or normally developing children.[13,14] The mental and psychological problems among parents of ASD include depression, stress, anxiety, and emotional disturbance, which may, in fact, lead to suicidal tendencies.[15-17] In addition, many parents experience financial difficulties as a result of expensive out-of-

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Received Date : 24 October 2021
Accepted Date : 20 December 2021

pocket medical expenditures, underemployment or job loss.[18-22] Therefore, it is not surprising that parents of children with ASD often feel strained by their responsibilities as a caregiver.

According to a recent study, around 0.84% of children in Bangladesh are affected by autism[23], and in numbers, nearly 3000 children are diagnosed with ASD. The prevalence rate among boys and girls is one per 94 and 150 children, respectively.[24] The patient registration data at Cambridge Medical University revealed a rise in the number of autistic children seeking medical help, from twelve in 2001 to 105 in 2009.[25] In another nationwide survey conducted in 2013, autism incidence was 0.15 percent among a population of 7200 people in seven upazilas in Bangladesh.[26] In a 2016 research conducted by Bangladesh's Ministry of Social Welfare, autism was found to account for 19 percent of all neurological impairments documented.[23] People in low-income countries, like Bangladesh, have a common propensity

to stigmatize persons with mental illness or autism, and their families often experience societal devaluation, discrimination, injustice, and increased level of parental stress.[27] Researchers reported that higher parental stress resulted in restricted father-child interaction, reduced childcare obligation, and a high risk of drug abuse among fathers with autistic children.[28]

The purpose of the current study was to contribute to the literature on autism and investigate the level of caregiver burden and psychological distress of parents of children with ASD. Our study investigated the following hypotheses: Parents having children with autism is more likely to deal with higher stress level and caregiver burden; Mother of children with ASD are more prone to suffer from psychological distress and caregiver burden; socio-demographic variable has an impact on parental stress.

Materials and methods

Study design

This was a descriptive, cross-sectional study, and a pre-validated structured questionnaire was used to conduct the survey. This study was conducted between January 2015 and February 2017 at the Out Patient Department (OPD) of the Institute for Pediatric Neuro-disorder and Autism (IPNA), Bangabandhu Sheikh Mujib Medical University (BSMMU), Out Patient Department (OPD) of Psychiatry, BSMMU and Out-patient Department (Child Guidance Clinic), National Institute of Mental Health (NIMH), Sher -E-Bangla Nagar, Dhaka.

A total of 180 parents of children with autism spectrum disorder participated in this study. The sample size was calculated using power calculation formula: $n_0 = z^2pq / d^2$, where, n_0 = required sample size when population >10000; z = significance level at 95% CI (1.96); p = prevalence (0.0045); q = 1-p; d = degree of accuracy desired (0.01).

The inclusion criteria for this study include the following: Bangladeshi nationality; parents of children diagnosed to have ASD according to DSM-IV criteria[29], absence of intellectual impairment, dementia, psychotic disorders, bipolar disorder, drug addiction, or serious medical conditions (e.g., cardiovascular or pulmonary disorder); not living with another child or adolescent with mental illness or chronic medical condition.

Study tool

The questionnaire was structured after reviewing a number of literature and divided into three sections. The first section of the questionnaire was comprised of parent's personal information, including age, relationship with the child, family structure, marital status, education, employment, and monthly income. The questions in the second section were related to the children with ASD: age, gender, age at which the child was diagnosed with ASD, presence of comorbidities, and duration of caregiving. The final section was designed to assess the severity of the burden and psychiatric disorder among the parents of the autistic child using the Zarit Burden Interview (ZBI, 22-item) **(30)**. It consists of 22 items that are scored on a 5-point Likert scale from 0 (never) to 4 (nearly). The total score of the ZBI interview was calculated and then graded as follows: little or no burden (0-20), mild to moderate burden (21-40), moderate to severe burden (41-60), and severe burden (61-88).

Data collection

Participants, only those who were willing to participate in this survey, were provided the questionnaire to fill it up. Among 240 parents of children with ASD who were approached, 213 parents agreed to participate, and of them, 33 responses were found incomplete and were therefore disregarded. Finally, 180 correctly responded data were transferred for statistical analysis. The participation ratio was 79.5% in this study.

Ethical approval

Ethical approval was acquired from the Institutional Ethics Committee of the Bangabandhu Sheikh Mujib Medical University (BSMMU) before the starting of the data collection. Also, formal authorization was received

from the institutions where the study was performed. During the face-to-face interview, individuals assigned to collect the response first explained the purpose and importance of the study to the potential respondents, and their verbal consent was obtained.

Statistical analysis

The collected data were analyzed using IBM Statistical Package for Social Science (SPSS; version 21.0). Categorical variables are expressed as percentages, and continuous variables are presented as mean ± SD, Standard deviation (average age and daily average caregiving time) or mean ± SEM, Standard Error of Mean (degree of burden). Correlation between variables and parent's burden levels were analyzed using the independent sample *t*-test and one-way ANOVA. Responses with multiple answers were defined in multiple response sets before descriptive statistical analysis. p-value less than 0.05 was considered statistically significant.

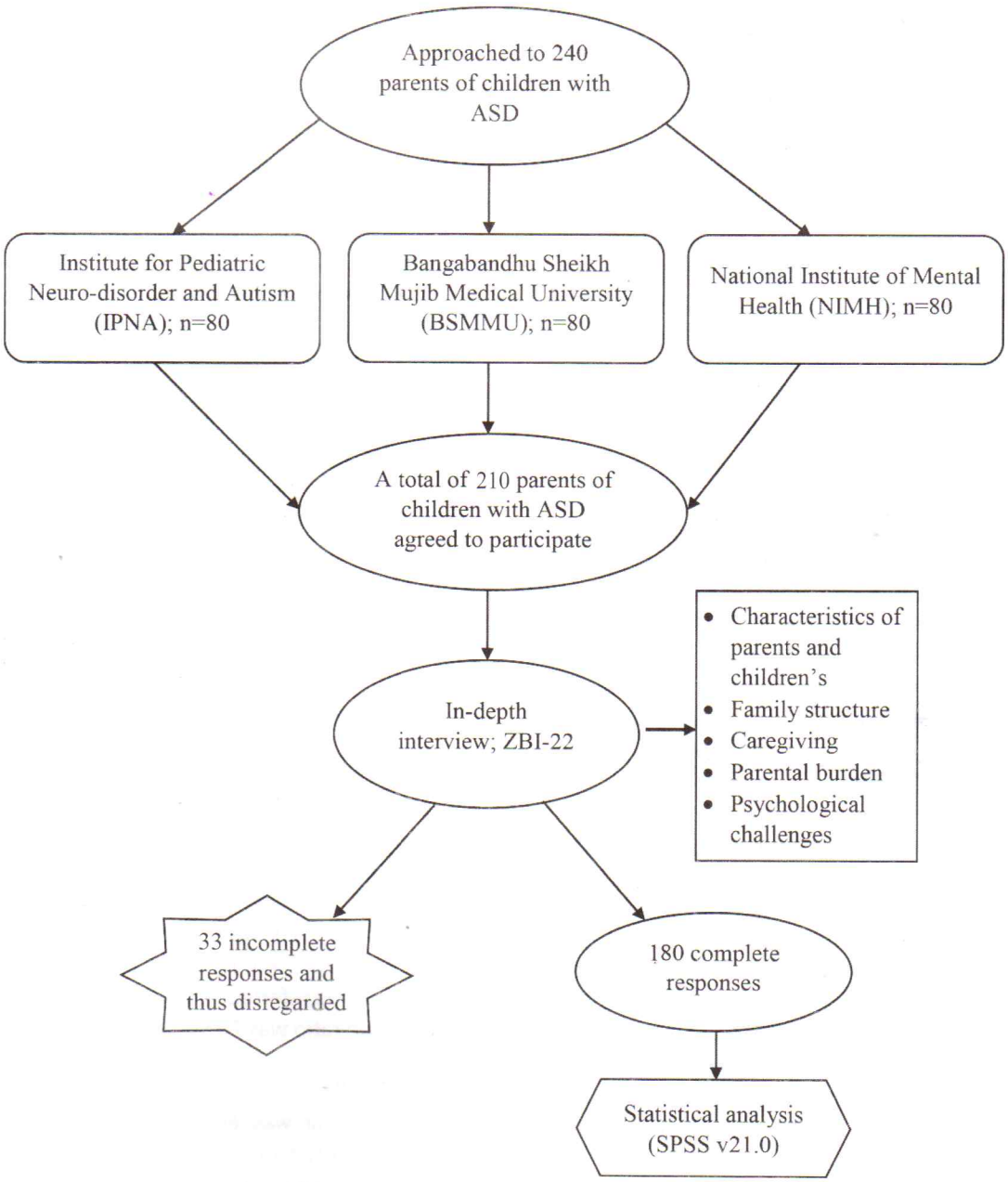

Figure 1. Schematic presentation of sampling and data collection.

Results

The interviewed parents were predominantly mothers, accounting for 61.7% of the total respondents. Large percentages were young parents (65.0%), aged between 21 to 35 years,

55.0% were unemployed, 60.5% had only primary and secondary school education, and 62.2% lived in a joint family. The monthly income of almost half of the parents (48.9%) was between BDT 11000 and 30000, and 78.9% of the participants were married. The mean age of the children in the sample group was 4.68 ± 0.96 years, and the majority (62.8%) were boys. Nearly half of the children (46.1%) were diagnosed with ASD in the second year of birth, and comorbidities were present in 31.7%. On average, parents spent 7.62 ± 2.74 hours daily on caregiving, and 45.6% were caregiving for five years and above (Table I).

The average score of the mothers' degree of burden was significantly higher as compared with the fathers (moderate to severe and severe: $p<0.01$; low and mild to moderate: $p<0.05$). The mild to moderate burden score of older parents was notably higher ($p<0.05$), and the mean score of moderate to severe and severe burden level was significantly higher in unemployed parents ($p<0.05$). Parents who lived in nuclear families ($p<0.05$) and monthly income is below average ($p<0.01$) had significantly higher burden scores (moderate to severe and severe), and the average burden score of single parents was statistically higher than the married (moderate to severe and severe: $p<0.05$; low and mild to moderate: $p<0.01$). The burden scores of the parents of children who have comorbidities were remarkably higher compared with the parents of children with no comorbidities ($p<0.01$). Parents who spent more than 8 hours daily giving extra care to their children had higher moderate to severe and severe burden scores ($p<0.05$) (Table II).

It was found that 65.6% of the parents were diagnosed case of psychological disorder and suffering from extreme psychological distress, and the rest of the other parents acknowledged that they had often experienced mental and emotional stress but never approached a physician for diagnosis. When the responses of the parents were analyzed, it was observed that more than half of the parents (53.9%; n=97) were suffering from major depressive disorder, and the two other most experienced psychological disorders among parents were anxiety (43.3%; n=78) and panic (33.9%; n=61) disorder; 10.6% (n=19) had experienced suicidal ideation (Table III).

Table 1. Descriptive characteristics of children with ASD and their parents (n = 180)

	n	%
Interviewed parent		
Mother	111	67.7
Father	69	38.3
Parents age (mean age= 32.2 ± 6.9 years)		
21 to 35 years	117	65.0
36 years and above	63	35.0
Employment status		
Employed	81	45.0
Unemployed	99	55.0
Education status		
Illiterate	12	6.7
Primary and secondary level	109	60.5
Graduate and above	59	32.8
Family type		
Nuclear family	38	37.8
Joint family	112	62.2
Income status (BDT)		
Low (less than 10000)	18	10.0
Average (11000 to 30000)	88	48.9
High (31000 and above)	74	41.1
Marital status		
Married	142	78.9
Single parent	38	41.1
Gender of the children		
Boy	113	62.8
Girl	67	37.2
Age of children (mean age = 4.68 ± 0.96 years)		
3 years or less	19	10.6
4 years	63	35.0
5 years and above	38	54.4
Age at which the child was diagnosed with ASD		
First year of the birth	36	20.0
Second year	83.	46.1
Third year and above	61	33.9
Comorbidities		
Yes	57	31.7
No	123	68.3
Daily caregiving time (mean time = 7.62 ± 2.74 hours)		
Less than 8 hours	75	41.7
8 hours and above	105	58
Duration of caregiving		
1 to 4 years	98	54.4
5 years and above	82	45.6

Table 2. Distribution of variables with parental burden level among parents of children with autism spectrum disorder (n = 180)

	Level of burden			
	Moderate to severe and severe (n=108; 60%)		Little or no and mild to moderate (n=72; 40%)	
	Mean score ± SEM	n (%)	Mean score ± SEM	n (%)
Mother	63.97 ± 1.65	78 (70.3)	24.91 ± 2.04	33 (29.7)
Father	55.90 ± 2.27	30 (43.5)	18.97 ± 1.50	39 (56.5)
p	0.009**	-	0.020*	-
t	2.680	-	2.388	-
Parents age				
21 to 35 years	53.25 ± 1.14	64 (54.7)	22.43 ± 1.50	53 (45.3)
36 years and above	56.43 ± 1.83	44 (60.3)	27.38 ± 1.63	29 (39.7)
p	0.123	-	0.039*	-
t	1.555	-	2.091	-
Employment status				
Employed	54.66 ± 1.30	50 (61.7)	25.19 ± 1.76	31 (38.3)
Unemployed	59.62 ± 1.62	58 (56.3)	26.85 ± 1.53	41 (43.7)
p	0.021*	-	0.478	-
t	2.335	-	0.714	
Education status				
Illiterate	56.25 ± 5.42	8 (66.7)	26.25 ± 4.37	4 (33.3)
Primary and secondary level	55.22 ± 1.45	67 (61.5)	23.00 ± 1.39	42 (38.5)
Graduate and above	54.39 ± 1.67	33 (55.9)	23.23 ± 2.11	26 (44.1)
p	0.901	-	0.814	-
F	0.105	-	0.207	-
Family type				
Nuclear family	61.62 ± 1.88	37 (54.4)	26.48 ± 1.94	31 (45.6)
Joint family	56.69 ± 1.28	71 (63.4)	22.44 ± 1.45	41 (36.6)
p	0.029*	-	0.092	-
t	2.213	-	1.709	-
Income status (BDT)				
Low	69.20 ± 1.91	10 (55.6)	20.88 ± 2.12	8 (44.4)
Average	64.62 ± 1.87	52 (59.1)	23.89 ± 1.48	36 (40.9)
High	57.35 ± 1.86	46 (62.2)	21.68 ± 1.37	28 (37.8)
p	0.004**	-	0.440	-
F	5.837	-	0.832	-
Marital status				
Married	57.06 ± 1.37	82 (57.7)	13.88 ± 0.90	60 (42.3)
Single parent	62.54 ± 2.29	26 (68.4)	20.42 ± 1.66	12 (31.6)
p	0.049*	-	0.003**	-
t	1.993	-	3.039	-
Gender of the children				
Boy	49.73 ± 0.84	67 (59.3)	22.50 ± 1.54	46 (40.7)
Girl	51.49 ± 1.32	41 (61.2)	25.50 ± 1.86	26 (38.8)
p	0.239	-	0.225	-
t	1.184	-	1.226	-
Comorbidities				
Yes	60.98 ± 1.74	40 (70.2)	25.71 ± 1.82	17 (29.8)
No	53.19 ± 1.15	68 (55.3)	18.87 ± 0.91	55 (44.7)
p	0.000**	-	0.001**	-
t	3.888	-	3.550	-
Daily caregiving time				
Less than 8 hours	52.93± 1.31	42(56.0)	20.58± 2.10	33(44.0)
8 hours and above	57.15 ± 1.45	66 (62.9)	23.15 ± 1.61	39 (37.1)
p	0.047*	-	0.327	-
t	2.009	-	0.988	-
Duration of caregiving				
1 to 4 years	56.62±1.69	63(64.3)	25.60±1.73	35(35.7)
5 years and above	51.87 ± 1.45	45 (54.9)	24.73 ± 1.43	37 (45.1)
p	0.045*	-	0.698	-
t	2.029	-	0.390	-

* p<0.05; ** p<0.01 t = Independent samples t-test; F = One-way ANOVA, Tukey test

Table 3. Distribution of the major psychological disorders that the parents of children with ASD experienced (n = 180)

Psychotic disorder	n	%
Major depressive disorder	97	53.9
Generalized anxiety disorder	78	43.3
Panic disorder	61	33.9
Social phobia	57	31.7
Obsessive compulsive disorder	36	20.0
Bipolar mood disorder	31	17.2
Adjustment disorder	24	13.3
Dysthymic disorder	21	11.7
Suicidal thought	19	10.6
Agoraphobia	17	9.4
Alcohol dependence	17	9.4
Somatoform symptom disorder	14	7.8
Cannabis abuse	13	7.2
Specific phobia	4	2.2
No diagnosis	62	34.4

Discussion

The aim of this study was to investigate the caregiver burden and the major psychological challenges experienced by the parents of children with ASD in three tertiary hospitals in Bangladesh: BSMMU, IPNA, and NIMH. It was evident that the degree of caregiver burden among the parents of children with ASD in the sample group was high, and the majority of the parents experienced mental health issues.

Evidence suggests that mothers of children with ASD are more affected mentally compared to fathers.[29-31] Our findings indicate that the perceived burden scores of the mothers in our sample group were higher than the fathers. The possible reason could be mothers in Bangladesh have more responsibility for their children's upbringing than fathers. In fact, in most societies, women concentrate more on household responsibilities, whilst fathers tend to focus mostly on the family's financial support.[32] In another study by Elçi (2004), where he investigated the impact of social support, stress levels, and coping strategies in families of children with ASD, reported that mothers of autistic children had encountered more challenges and experienced burnout compared with the fathers because they took on the majority of the parenting responsibilities.[33]

Demographic and socioeconomic factors such as employment, monthly earning, marital status, and family structure are linked with the caregiving outcome, caregiver perceived burden, and psychological distress.[34] We observed that parental burden was higher among parents who were unemployed than the parents who worked outside. Most of the unemployed parents, especially the mothers who gave up their job to stay home so that they can meet the extra care needs of their children, faced more challenging conditions because they experienced more economic challenges. However, in a similar study, it was outlined that employed parents experienced higher stress levels because they feel taking care of children with ASD is a complex task and requires personal and professional sacrifices.[35] Economic burden made it difficult for the parents to meet the high medical expenses, particularly those children who had comorbidities. In fact, a portion of the respondents (31.7%; n=57) in our sample group experienced a higher burden ($p<0.01$) because of the presence of comorbidities in their childrens' as their treatment required extra medical attention and cost.

Single parents' reported a higher level of stress than those who were married. Their psychological distress may be the result of extreme emotional pain, relationship conflicts, coparenting disengagement as well as economic disadvantages.[36,37] The correlation between caregivers' burden and family structure is not extensively studied and thus still remains elusive. The findings of our study indicated a higher burden level among parents who lived in nuclear families than those who lived in extended families. This may be because the parents of the joint families might have some sort of support from other members that allowed them to spend more time in caregiving, which might not be available to the parents who lived in nuclear families.

In this study, we noticed a positive correlation between the time spent on caregiving and parents' burden level. The more time spent on caregiving tasks, the poorer the caregiving outcome, resulting in higher parental burden and psychological distress. A cross-sectional study conducted on Jordan's parents of children with ASD reported that negative perception of caregiving outcomes is linked with increased depression and anxiety and the ultimate cause of psychological distress in parents of children with ASD.[35]

We documented that parents who were caregiving for more than five years have lower burden scores, meaning the stress level of parents is inversely related to the age

of the children. The stress level of the parents in the earlier years of caregiving was higher, and the burden level decreased as the age of the children with ASD increased, which is consistent with previous findings.[38] Bozkurt, Uysal, and Düzkaya (2019) observed an increased self-confident approach and optimistic approach scores as time elapsed, which might be explained by the fact that with time, parents accepted their children's condition, got accustomed to it or might have found some helping hands.[39]

Findings from this study suggest that parents with ASD children were more likely to suffer from depression and anxiety than any other psychological disorders and were consistent with previous studies.[40-42] In addition, a recent meta-analysis found that the mothers of children with developmental disabilities had a 29% higher risk of suffering from depression than the mothers of typically developing children.[43] An alarming finding of our study was that 10.6% (n=19) of the parents had experienced suicidal ideation at some point of caregiving. This alarming incidence rate is most likely due to underlying depression, but it might also be exacerbated by the fact that parents with ASD children are frequently insulted and humiliated by others.[44]

Limitations

The study was conducted on 180 parents of children with ASD in three tertiary hospitals located in Dhaka, Bangladesh, and therefore, the findings of the study cannot be generalized. It is also worth mentioning that different forms and severity of autism exist, which were not precisely evaluated and might have an influence on the results.[45] We, therefore, cannot eliminate if parents of children with the severe form of ASD are more or less likely to respond differently than the parents of children with mild ASD phenotype.

Clinical implications

Parents of ASD children suffer from life-long psychological distress because they feel that their children should be protected and supported throughout life. Once it has been determined that parents are experiencing mental distress, it is important for the healthcare professionals working with these families to use strategies to help ease some of their distress, therefore ensuring their well-being.

In Bangladesh, interventions for ASD children and social support services for children and their parents are insufficient. Here, families are solely responsible for their children's care, and a lot of families have been left to their own fate. Parents in Bangladesh might be directed to forums and autism-related organizations so that they can share and discuss their experiences, which could help parents facilitate and strengthen the social support system.

Conclusion

The findings of our study highlighted the perceived burden of parents of children with autism spectrum disorder and the psychological impact on the caregivers. This study supports a consistent finding that the perceived burden among mothers of children with ASD is significantly higher than the fathers. Moreover, the degree of burden was influenced by factors such as employment, economic and marital status, presence of comorbidities, and duration of daily caregiving. The findings emphasize the urgent need for the development of interventions and social support systems for alleviating the caregiver burden and improving the mental health of parents of children with ASD, thereby ensuring their overall well-being.

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Original Article

Determinants of Inappropriate Complementary Feeding Practice among 6 months-2 years old children attending Institute of Child and Mother Health (ICMH), Dhaka

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Abstract

Background: Nutritional status of infants and young children chiefly depends on proper feeding practice; despite child rearing that often vary across population. Childhood malnutrition remains one of the major underlying causes of morbidity and mortality among younger children particularly from lower and mid income countries (LMIC) like Bangladesh.

Objective: To identify determinants of practicing inappropriate complementary feeding (CF) among the infants and young children and to find out if these CF-determinants are associated with socio-demographic characteristics of child's families.

Methods: This cross-sectionally designed study hybrid with some analytical methods were conducted among 6-24 months old children attending the out-patient and indoor departments of Pediatric, Institute of Child and Mother Health (ICMH).

Results: Of total 273 children, only 20% received CF appropriately but 80% got it 'inappropriately' based on all parameters studied, on an average. Good CF practice were significantly associated with child's age group (P<0.01), gender (0.02), parental education (<0.01) and monthly income (<0.01). None of the factors like time of starting CF (right after 6 months), type of food groups (carbohydrate, protein, fat, vegetables, vitamin) introduced to young children were not associated with any of 6 types of major food groups, significantly, except for citrous fruits (p>0.01). Frequency of feeding per day was also not significantly associated with CF-feeding practice (p>0,83). Similarly, none of the consistency of food (p>0.95), its amount (p>0.28), feeding technique (p>0.72) and mother's motivation for child's self-feeding (p>0.27) were not significantly associated with CF practices. Most common reason for delayed CF was 'tried but failed' in 53% and 'did not know' the reason exactly in 10.5%. However, 10.5% mother's felt that breast milk was enough for the child to feed, early starting of CF being mothers' insufficient breast milk in 63% and the rest 24% were ignorant on earlier starting the CF.

Conclusions: Major findings of this study revealed that factors like, gender, paternal education, monthly family income, citrus food significantly differed between appropriate and inappropriate CF practices. However we strongly recommend further muti-center studies involving larger sample size before refuting or accepting our findings that this study yielded based in one hospital set up only.

Key Word: Complementary Feeding, Practice, Children, Mother, Socio-demographic Status

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Received Date: 14 October, 2021

Accepted Date: 16 December, 2021

Introduction

Complementary feeding (CF) remains one of the core indicators of Infant and Young Child Feeding Practices (IYCF) that essentially needs to be initiated at right age of infants/children. Delayed/ inappropriate CF or untimely introduction of CF too late or early, or, inadequate in quantity/quality of food and/or unhygienic practices can lead the children to detrimental threats to health and nutritional status of children.[1]

Childhood malnutrition remains a major public health problem especially in low and middle-income countries (LMIC). Prevalence of early introduction of CF, low food frequency, and less dietary diversity remains frequent in many countries, particularly from LMICs.[2]

In developing countries, inadequate knowledge and cultural practice on complementary feeding (CF) remains one of the main causes for childhood malnutrition[3,5] that are often influenced by cultural mal/practices, wrong beliefs and inadequate knowledge of parents regarding appropriate CF-practices.[4,5] But infant's nutritional status basically depends on feeding practices in our community- where child rearing practices vary widely among people, religions, casts, and geographic location of regions and districts. WHO recommended that exclusive breastfeeding (EBF) should be started in first 6 months and then to start CF immidiately.[6] WHO defined CF-period as "period during which other foods or liquids are provided along with breast milk" and states "any nutrient-containing foods or liquids other than breast milk are given to young children during CF remain complementary foods".[7]

In Bangladesh CF generally starts too early or late and, thus, children are fed inappropriately, in some events, as the icddr, b experts opined.[8] However, improvement of CF practices among our mothers should also be tried to make it possible through proper utilization of existing health services in Bangladesh, as found it evident in India.[9, 10] It is essential to utilize the missed opportunities as our EPI's immunization sessions follows. This will assist our rural mothers with the advice on particularly focusing on correct CF practice.[11] However, attention must also be focused on socioeconomic empowerment of poorer mothers with special emphasize on female education and utilization of EPI session to ventilate prudent information/knowledge on correct time to start CF, consistency/density of food, and quantity of food to be fed their children, as CF, rightly.[12]

Materials and Methods

Study design: This was a cross sectional and analytical study.

Study population: of 273 children from 6-24 months aged children.

Study place: 6-24 months aged children mothers who attending at OPD and IPD of Pediatrics dept. Mothers who came to ICMH (outpatient and inpatient department) for, treatment of their children and who fulfilled the inclusion criteria were interviewed through a pre-tested and structured questionnaire, which was designed on the following essential components of CF:

- Starting time of CF
- Variety of CF-foods
- Frequency of feeding
- Consistency of foods
- Continuation of breast feeding, with CF
- Problems faced during CF
- CF reason of inappropriate-CF practice

Consistency of food was assessed as appropriate, are: thickness, stayed on the spoon and hold a shape on plate, or thin that flow off the spoon and don't hold shape on the plate. Food quantity was assessed showing a 250 ml cup.

Recommended quantity for 6-8m aged children:

-Gradually increased to approx ½ cup each meal,

-For 9-11mon children: approx ½ cup each meal

-For 12-23m children: approx 1 cup each meal.

-Appropriate time for CF was taken as complete time of 6 months.

Data Analysis: SPSS: Win, V. 23.0 was used for data analysis. All continuous variables were expressed in mean±SD, while Chi-Square test for proportions and % were used for categorical variables. P-values of <0.05 was regarded as significant, although.

Results

Figure 1 shows that 55 (20.1%) children had received appropriate complementary feeding but 218 (79.9%) got inappropriate CF.

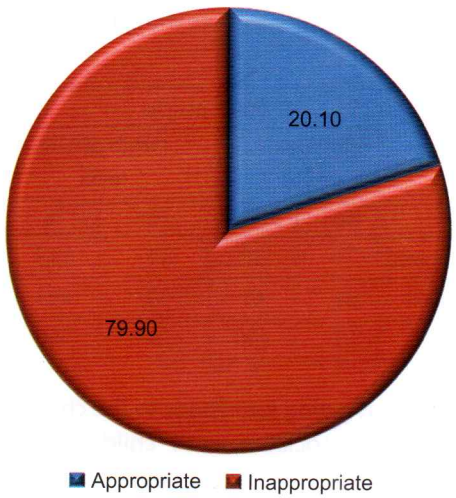

Figure 1: CF practices of young children.

Table-1: Association of CF practices with Socio- demographic Characteristics (n=273)

Parameters	Feeding Practices				P-value
	Appropriate n=55		Inappropriate n=218		
	No	%	No	%	
Socio-demographic characteristics					
Age group (mons)					
6-8 months	34	61	111	50.9	0.01
9-11 months	18	32	102	46.8	
12-23 months	3	5.5	5	2.3	
Gender					
Male	35	63	89	40	0.02
Female	20	36	12	59	
Place of child's residence					
Rural	26	47	97	44	0.62
Urban	19	34	68	31	
Slum	10	182	53	24	
Child's Mother's education					
Primary	9	16	15	72.9	<0.01
Secondary	26	47	55	25	
Higher-second	8	14	3	1.4	
Graduate	12	21	1	0.5	
Child's Father's education					
Primary	7	12	10	47	<0.01
Secondary	13	23	72	33	
Higher-second	9	16	34	15	
Graduate	26	47	8	3	
Monthly Family Income					
< Tk. 5000+	21	38	12	58	<0.01
Tk.5000-10,000	26	47	88	40	
> Tk. 10000	8	14	3	1	

Table-1 describes the association of CF practices with child age group, gender, place of residence, parental education and occupation, monthly family income. This revealed that the appropriate CF practice was significantly associated with younger children ($p<0.01$), being girls ($p=0.02$), parental education ($p<0.01$) and occupation for both mother and father ($p<0.01$), including their monthly income being higher ($p<0.01$).

Table-2: Association starting CF, food types, feeding frequency with of CF practice (n=273)

Parameters	Feeding Practices				P-value
	Appropriate, n=55		Inappropriate n=218		
	No.	%	No.	%	
Time of starting					
Before 6 mon.	24	43	64	29.4	0.09
At 6 months	20	36	100	45.9	
Within 6-11 months)	5	9.1	46	21.1	
after 12-23 months)	6	10	8	3.7	
Types of food given as CF					
Khichuri	25	45	95	43.6	0.78
Family diet	11	20	34	15.6	
Suji	6	10	23	10.6	
Cerelac	4	7.3	23	10.6	
Formula feeding	5	9.1	14	6.4	
Others	3	5.5	16	7.3	
Fruit juice	1	1.8	13	6.0	
Six major types of food given as CF					
Carbohydrate	41	74	137	62.8	0.10
Protein	17	30	86	39.4	0.24
Fat	19	34	101	46.3	0.11
Vegetables	14	25	62	28.4	0.65
Vit.A rich food	23	41	67	30.7	0.11
Citrus food	7	12	64	29.4	0.01
Frequency of feeding/day					
6-8 m (2 times)	16	29	60	27.5	0.83
9-11 m (3-5 times)	28	50	106	48.6	
12-33m (3-5 times)	11	20	52	23.9	

According to table-2, it yields the factors that influence inappropriate CF practices. This shows no significant association either in starting time of CF ($p=0.09$), nor with types of food ($p=0.78$). Further, association of CF

yields no association with major food groups for carbs (p=0.10), for protein (p=0.24), for fat (p=0.11), for vegetables (p=0.65) and for vit-A rich food (p=0.11) except citrus food (p<0.01). Finally, frequency of feeding/day also did not reveal any difference with appropriate CF practices (p=0.83).

Table-3: Association of CF practices with food consistency, food amount, feeding technique, mother's encouragement on self-feeding by the children (n=273)

Parameters	Feeding Practices				P-value
	Appropriate n=55		Inappropriate n=218		
	No	%	No.	%	
Consistency food					
Liquid	31	56	116	53	0.95
Semi solid	12	21	54	24	
Small pieces	7	12	30	13	
Normal	5	9	18	8	
Amount of each feeding (main meals)					
6-8 m (1/2 cup/bati)	16	29	56	25	0.28
9-11 m	34	61	123	56	
(1/2 cup/bati)					
12-23 m	5	9	39	17	
(1 full cup/bati)					
Feeding technique (by the mother)					
6-8 m (mother/ caregiver	37	67	134	61	0.72
9-11 m (by own hand)	7	12	40	18	
12-23 m (by own hand)	5	9	24	11	
Forced feeding	6	10		20	9.2
Mother encouragement for child on self-feeding					
Yes	47	85	172	78	0.27
No	8	14	46	21	

Findings of table-3 yielded none of the factors as significantly associated with CF practice, like: food consistency (p=0.95), amount of each feeding (p=0.28), feeding technique (p=0.72) and mother encouragement on child for self-feeding (p=0.27).

Table-4: Association of CF practices with junk food taking habit (n=273)

Parameters	Feeding Practices				p-value
	Appropriate n=218		Inappropriate n=55		
	No	%	No	%	
Junk foods given	21	38	111	50.9	0.09
Junk not given	34	61	107	49.1	
Total	55	100	218	100	

Table-4 yields that giving junk foods to the children were not significantly associated with child's CF practice (p=0.09).

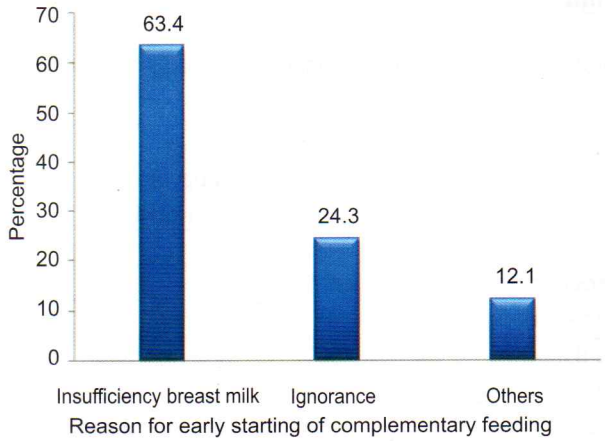

Figure-2: Reasons for starting complementary feeding earlier (n=273)

The bar diagram (Fig-2) illustrates that the main reason of introducing early CF to their children were: mother's breast milk being insufficient (78, 63.4%), followed by mother's ignorance on CF (30, 24.3%) and 15 mothers (12%) said other causes on why they initiated early CF to their children, being forced .

Discussion

Breast milk alone is sufficient to meet the child's nutritional requirement up to 6 months, but after that period it requires some complementary feeding to the children to ensure supply of adequate micronutrients. As weaning period plays a major role in growth and development of child's life, appropriate weaning practice among mothers should be ensured as a must. The transition from exclusive breastfeeding (EBF) to family foods is considered as complementary feeding (CF) which generally covers the period from 6–23 months of age, along with continued breastfeeding (BF). [13]

Appropriate nutrition that are mandatory during the 1,000-day window period, (between start of a woman's pregnancy upto her child's second birthday) being critical for future health, wellbeing, and success of her child, the CF plays an essential and integral part to child's health and nutrition. [14]

Thus, CF remains the principal milestone in a child's life in terms of health, nutrition and cognition development. We therefore, conducted this cross-sectionally designed study including few analytical methods to identify the determinants of CF practice among children 6 months to 2 years age attending at the Institute of Child and Mother Health (ICMH). We studied 273 children who met the inclusion criteria.

Contrary to Akteruzzaman et al.[3] we found that the appropriate consistency of CF among the study children as 51%. Findings of our study also revealed it as 20% children (55 of 273) whose mothers introduced CF appropriately, against ~80% who received it inappropriately. This findings also remains consisted with other studies from Bangladesh, Ghana and Nepal.[15,16,17]

In rural areas of Bangladesh, most of the mothers knew only thick and dense CF to introduce their children, but they were not aware on semi-solid and soft CF to be given to children's at proper age.

A study rural Indian community (Doiwala block of Dehradun district) Saxena and Kumar[18] reported that 87.3% children of >6 months of age were on CF and they also reported that some mothers gave appropriate CF to them 70.1%.

We, in this study found that various factors influenced the inappropriate CF practices among our mothers. By assessing different factors like children's gender, residence, educational status of parents, occupations of parents, monthly family income our data revealed that female children, educational status of parents, occupation of parents and monthly family income were significantly associated with appropriate CF practice ($p < 0.05$).

Studies from Nigeria[10], Pakistan[19] and India[20] reported a statistically significant association between maternal education and initiation of BF and starting timing of CF practices.[10,19,20] Contrary to a study from Nepal our findings did not yield any significant association between mothers' education and initiation of breast feeding (BF), another findings of this study also showed that i.e. type of family and its size was associated with BF.[21]

Findings of our studies revealed that starting time of CF after 6 months was significantly associated with CF practices correctly. Conversely, CF food, major food groups (e.g. carbohydrate, protein, fat, vegetables, vitamin and food frequency per day) according to child's age group were not significantly associated with CF practices. This finding from our study remain consistent with Demilew et al.[22] and Akteruzzaman et al.[3] who found 7% and 6.4% mothers followed appropriate CF practice that we found in our current study, as well.

Moreover, we found in our study that more than half (60.8%) of mothers fed their children in less than two times, while 14.4% fed >3times a day. This might be well owing to social-norms, cultural difference and variation in educational levels between our and others findings.

Again, Gain et al.[23] observed that 1/4th mothers fed CF to their children appropriately, start CF in <5months of age, though other mothers as they stated don't know start CF properly. These studies reported that mothers stated: "I think appropriate time to start CF is after fulfilling the age of 6 months but I started it from 3rd month for my baby".[24,25]

In this study, factors of CF practices were measured separately. Consistency of food was assessed as appropriate, are: thickness, stayed on the spoon and hold a shape on plate, or thin that flow off the spoon and don't hold shape on the plate. From another study, mothers/caregivers reported that when a child started receiving soft-foods, semi-solids, and solid foods, mothers did not know it properly.

Introduction of solid, semi-solid, or soft foods was further categorized as early CF introduction (grouped as 0–1 month, 2-3 months, 4–5 months), and appropriate age of CF introduction (as 6–8 months of age).[26]

Findings of our study yielded most common reason among 78 (63.4%) mothers who started CF earlier because the mother felt that her breast milk was not sufficient for her child. The 2nd most common reason was ignorance on CF among mothers (n=30, 24.3%) and due to other different causes (n=15, 12.1%) who started CF earlier to their kids.

Another study by Akteruzzaman et al.[3] from Bangladesh reported various reasons for mothers to start early CF to their children. Among all reasons, most common was mothers (87.7%) in starting early CF practices because

they perceived that their children's did not get enough breast milk, which resembles to our findings too. Another reason was elderly members of the family (7.7%) who used to advise them to introduce CF earlier not knowing about the time of initiation of CF (4.6%). Our findings were consistent with another study where receive inappropriate CF (84%) but in other studies from Bangladesh and Ethiopia showing it (49.2%), (30.6%) and (27.5%) respectively. [27,28,29]

Conclusion

Our study revealed gender, parental education, parental occupation, monthly family income, time of starting of feeding, citrus food and junk foods given were significantly associated with complementary feeding practice. We strongly recommend that further multi-center studies involving larger sample size before refuting or accepting our findings that this study yielded based in one hospital set up only.

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Original Article

Neonatal Outcome of Anemic Pregnant Mother at Private Hospital in Dhaka City

Muhammad Jahangir

Abstract

Objective: This cross sectional study carried out among the anemic pregnant women to determine their neonatal outcome at a private hospital in Dhaka city.

Materials and Methods: This study was conducted among 110 pregnant women after 28 weeks of gestation was selected purposively. Data were collected by interviewing the with a structured pre-tested questionnaire.

Place and Period of Study: The study was conducted at Obstetrics department of the Ad-Din Barrister Rafiquil-Huq Hospital, Jurain, Dhaka and Bashundhara Ad-Din Medical College Hospital South Keranigonj, Dhaka during November 2019 to February 2020.

Results: Most of the respondents (38.2%) belonged between 16-20 years age group. The mean age was 23.74±5.127 years. Almost (49.1%) up to primary & (38.2%) were up to secondary/higher secondary level. Most of the respondents were homemaker (87.3%); Monthly family income means was 19340.91±12459.647. More than one third (37.3%) of the respondents were from low income family followed by 40.9% by middle income and high income family (21.8%).

Age at marriage mean 17.79±3.400 and age at the time of first conception mean 20.12±3.173 years. Most (90.9%) of the respondents had received ANC during pregnancy. Hemoglobin level shows that 20.9% of the respondents had 10-10.9 gm/dl, 66.4% had 8-9.9 gm/dl and rest 12.7% of the respondents had 6-7.9 gm/dl.

This study reveals that 12.7% of the respondents had congenital anomaly of newborn highest 90.9% of the respondent's fetal outcome were health & alive baby. More than half (51.8%) of the respondent's baby were ≤ 2.5 kg birth weight and 48.2% baby were more than 2.5 kg birth weight. There was a significant relation between low birth weight (LBW) less higher education.

Conclusion: All pregnant women should be given proper advice regarding their diet during pregnancy particularly on iron rich with details of foods. Dietary changes alone are not sufficient to correct an existing iron deficiency in pregnancy, and, thus, iron supplements may be necessary.

Keywords: Anemia, Low birth weight, Neonates,

Introduction

Anemia is a pathophysiological condition in which there is a marked reduction in the hemoglobin content of blood from the reference concentrations or in the number of red blood cells or defective maturation of red blood cells.[1] It affects all age groups, but pregnant women and children are more vulnerable.[2] Anemia, during pregnancy, is a commonly encountered medical disorder associated with adverse effects on the mother and the fetus.[3] Several exploratory studies estimated that anemia is currently affecting over 1.62 billion people of the world, a population of which 56 million are pregnant women.[4] Stevens et al. (2011) reported that the global prevalence of anemia in pregnant women is 38%. The significant burden of anemia is born in Asia and Africa were estimated that 60% and 52% of pregnant women, respectively, are anemic, and between 1% and 5% are severely anemic.[5] Anemia during pregnancy is more prevalent at 43% and 56% in developing countries compared with 9% and 18% in developed countries, respectively.[5]

The neonate mortality is very much associated with maternal and child health. Bangladesh has 24 neonate deaths per 1000 live births, in numbers it accounts for 76,722 neonate deaths. The infant mortality rate has also declined considerably; from 87/1000 live births in 1990 to 43/1000 in 2011. The services provided by the

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Received Date : 24 January, 2022
Accepted Date : 20 March, 2022

healthcare providers are very crucial at the time of child delivery. At the national level, only 26.9% of women are delivering in a facility, mostly in private sector (15.1%) at public hospitals (11.8%) and others facility (2%). The rest (about 71%) are delivered at home. About 2.4 million women deliver at home. The Demographic Health Survey also shows that only 21% of all births were delivered by a doctors and 6.1% by nurse, midwife, auxiliary nurse, which includes qualified doctors, nurses, midwives, paramedics, family welfare visitors (FWVs) and community skilled birth attendants (CSBAs). The rest are looked after by Traditional Birth attendants known as Dais. It is a reality at present and will remain so for the years to come that women, particularly rural poor women will deliver babies at home with the help of the traditional birth attendants, locally known as Dai Mas.[6]

Worldwide anaemia is a major cause of morbidity and mortality, mainly due to malnutrition & infection in the developing countries. Correction of this continues to pose an apparently insurmountable challenge, but for the economic & social reasons rather than back of medical knowledge.[7] Total prevalence of anaemia in the world is 30% of estimated world population of 5000 (1985) million people. Young children & pregnancy women are mostly affected globally. Regions with higher prevalence of anaemie are South Asia & Africa.[8]

Clinically, anemia is any hemoglobin (Hb) level <10.5 g/dL regardless of age; however, the World Health Organization (WHO) recommends maintaining Hb levels ≥11.0 g/dL during pregnancy. Anemia in pregnancy develops when physiological changes reduce Hb concentrations. These changes are mainly a result of nutritional deficiencies of which iron deficiency is the most common cause. Iron deficiency is the major cause for anemia in pregnant women, accounting for ~75% of all pregnancy anemia.[9]

Maternal mortality is higher in rural areas and among poorer and less educated communities. Adolescents face a higher risk of complications and death as a result of pregnancy than older women.[10]

The reduction of maternal and child deaths is a high priority for the international community, especially in view of the increased attention on the Millennium Development Goals 4 and 5. The South East Asia region accounts for almost one-third of global mortality in neonates and children under 5 years of age. Despite of wide disparities in socio-economic and health indicators, many countries in this region are unlikely to reach Millennium Development Goals 4 and 5.[11]

Bangladesh has made commendable progress in achieving MDG 4 and 5. Since 1990, there has been a remarkable reduction in maternal and child mortality, with an estimated 57% reduction in child mortality and 66% in maternal mortality. Bangladesh is on track for achieving MDG 4 and 5, progress in universal access to reproductive health is not yet at the required pace to achieve the targets set for 2015. In addition, Bangladesh needs to further augment activities to get better newborn health and promote skilled attendance at birth.[18] In South East Asia, child and infant mortality has reduced considerably but the neonatal mortality rate is still high. Newborn care is immense importance for the proper development and healthy life of a baby. A study in Bangladesh revealed an urgent need to educate mothers, and train traditional birth attendants and health workers on clean delivery practices, early neonatal care and prevention of delivery complications.[12]

Materials and Methods

This cross sectional study was carried out at obstetric Department of Ad-Din Barrister Rafiquil-Huq Hospital, Jurain, Dhaka and Bashundhara Ad-Din Medical College Hospital, South Keranigong, Dhaka. The study population was pregnant women with anemia at or after 28 weeks of gestation who delivered at these two private hospitals in Dhaka city. The sample size was 110. There was purposive selection of sample during study period. Data was collected by face to face interview of the respondents with a structured pretested questionnaire. All the collected data were organized and analyzed with the help of the software SPSS for windows version 20.

Results

In this study 110 anemic pregnant women were studied in two hospitals and the results shows highest 38.2% of pregnant women have found in the age group 16-20 years and mean (±SD) 23.74(±5.127). Respectively second and third highest 30% and 20.9% in the age group 21-25 years and 26-30 years. Majority (97.3%) was Muslims. About half (49.1%) of the respondents educational level was up to primary level, 38.2% of the respondents were up to secondary/higher secondary and 4.5% were up to graduate and above. Most (87.3%) of the respondents were homemaker by occupation and 12.7% respondents in business and in job. The mean (±SD) of monthly family income was taka 19340.91 (±12459.647). More than one third (37.3%) of the respondents were from low income family followed by 40.9% by middle income and high income family (21.8%) (Table 1).)

Table 1: Socio-demographic characteristics of the respondents (n=110)

Variables	Frequency	Percent
Age groups		
16-20 years	42	38.2
21-25 years	33	30.0
26-30 years	23	20.9
31-38 years	12	10.9
Religion		
Muslim	107	97.3
Hindu	3	2.7
Educational level		
Illiterate	8	7.3
Non formal education	1	.9
Primary level	54	49.1
Secondary/higher secondary	42	38.2
Graduate & above	5	4.5
Occupation of respondents		
Homemaker	96	87.3
Business & job	14	12.7
Monthly income (in Tk)		
Low (5000-10000)	41	37.3
Middle (10001-20000)	45	40.9
High (>20000)	24	21.8
Total	110	100.0

The mean age at marriage was 17.79±3.400. More than half (55.5%) of the respondents got married in the age interval of 16-20 years and about half (47.3%) of the respondents had concept ≤ 19 years age at first time. The mean age at first time of concept 20.12±3.173. (Table 2)

Table 2: Distribution of the respondents by age at marriage & first time concept (n=110)

Variables	Frequency	Percent
Age at marriage		
≤ 15 years	28	25.5
16-20 years	61	55.5
21-25 years	17	15.5
26-27 years	4	3.6
Age at first time concept		
≤ 19 years	52	47.3
20-24 years	45	40.9
25-29 years	13	11.8
Total	110	100.0

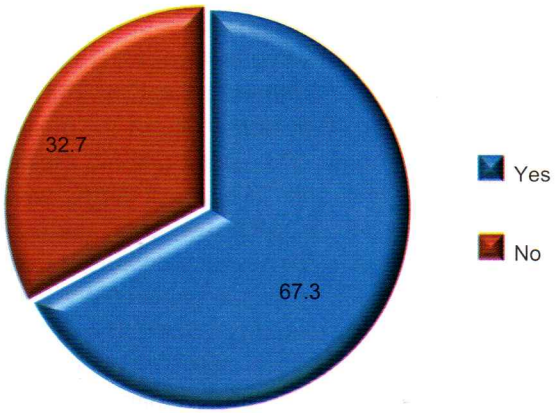

Fig.-1: Distribution of the respondents by knowledge anemia (n=110)

Figure no. 1 shows that more than two third (67.3%) of the respondents had knowledge about anemia but 32.7% of the respondents had no knowledge about this.

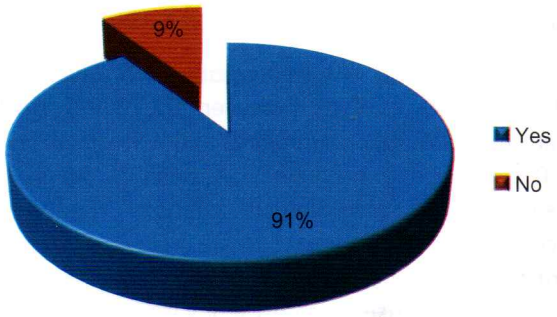

Fig.-2: Distribution of the respondents by received ANC during pregnancy (n=110)

Fig. 2 shows that most (90.9%) of the respondents had received ANC during pregnancy, only 9.1% respondents had no received ANC during pregnancy.

Most (78.2%) of the respondents was gestational age of full term, 16.4% were before term and only 5.5% were postdated of present baby. It also shows that past of obstetric history 93.1% had alive baby. A large percentage hemoglobin level of respondents had (66.4%) by 6-7.9 gm/dl. (Table 3)

Table 3: Distribution of the respondents by gestational age, past obstetric history and Hb level (n=110)

Variables	Frequency	Percent
Gestational age		
Full term	86	78.2
Before term	18	16.4
Postdated	6	5.5
Obstetric history		
Alive baby	110	93.1
Dead after birth	6	5.1
Still birth	1	0.8
Abortion	1	0.8
Hb level		
10-10.9 gm/dl	23	20.9
8-9.9 gm/dl	73	66.4
6-7.9 gm/dl	14	12.7
Total	110	100.0

Table 4 finds that only 12.7% of the respondents had congenital anomaly of newborn otherwise 87.3% had no congenital anomaly of newborn. Among them 90.9% of the respondent's fetal outcome were health & alive baby only 9.1% were alive but sick baby. More than half (51.8%) of the respondent's baby were ≤ 2.5 kg birth weight and 48.2% baby were more than 2.5 kg birth weight

Table 4: Distribution of the respondents by neonatal outcome (n=110)

Variables	Frequency	Percent
Congenital anomaly of newborn		
Yes	14	12.7
No	96	87.3
Fetal outcome		
Healthy & alive	100	90.9
Alive but sick	10	9.1
Birth weight		
≤ 2.5 kg	57	51.8
> 2.5 kg	53	48.2
Total	110	100.0

Discussion

The present study was conducted with the objective to find out the pregnancy outcome of anemic mother in a private hospital in Dhaka city. The study also looked for pregnant women with anemia at or after 28 weeks of gestation and had delivered at Obstetrics department of the Ad-Din Barrister Rafiquil-Huq Hospital, Jurain, Dhaka and Bashundhara Ad-Din Medical College Hospital South Keranigonj, Dhaka were sampling technique selected purposively and data were collected by face to face interview. The mean age was ± SD = 23.74±5.127 years, 38.2% of the respondents were in age group between 16-20 years. Most of the respondents (97.3%) were religion Islam whereas only 2.7% were Hindu. About half (49.1%) of the respondents educational level was up to primary level & 38.2% were up to secondary/higher secondary level Most (87.3%) of the respondents were homemaker by occupation and 12.7% respondents in business and in job. The mean (±SD) of monthly family income was taka 19340.91 (±12459.647). More than one third (37.3%) of the respondents were from low income family followed by 40.9% by middle income and high income family (21.8%). As per Bangladesh Demographics profile 2013, majority (89.5%) of the people in Bangladesh are Muslims which is nearly consistent with this study.[13]

In presents study found that mean age at marriage was 17.79±3.400. More than half (55.5%) of the respondents got married in the age interval of 16-20 years and about half (47.3%) of the respondents had concept ≤ 19 years age at first time. The mean age at first time of concept 20.12±3.173. (Table 2). Bangladesh population and Housing census 2011 found the mean age at marriage was 17.5 years which is similar to this study. Remarkably, their peek age at 1st delivery was around the age of 20 years. The mean age of first child birth was 20.67 years with standard deviation (SD) of ± 2.15 year. Lowest age was 14 years and highest was 30 years. Bangladesh demographic profile index mundi 2013, found mean age at 1stdelivery was 18.1 years which is almost similar to this study.[13,14]

Regarding knowledge on anemia found that more than two third (67.3%) of the respondents had knowledge about anemia but 32.7% of the respondents had no knowledge about this. Most (90.9%) of the respondents had received ANC during pregnancy. These findings were consistent with the findings by Acheampong K. et al. (2018) Ghana. international Journal of Health Sciences & Research.[15]

From study showed that gestational age most (78.2%) of the respondents gestational age of full term, 16.4% were before term and only 5.5% were postdated of present baby. Distribution of past obstetric history. Among them maximum (93.1%) of the respondents had alive baby.

Hemoglobin level shows that 20.9% of the respondents had 10-10.9 gm/dl of Hb level, 66.4% had 8-9.9 gm/dl and rest 12.7% of the respondents had 6-7.9 gm/dl of Hb level. Study reveals that only 12.7% of the respondents had congenital anomaly of newborn among them 90.9% of the respondent's fetal outcome were health & alive baby only 9.1% were alive but sick baby and 69.1% of the respondents had no problem of new born but 15.5%, 11.8% had respiratory distress, Jaundice and rest 3.6% had fever. Only 12.7% of the respondents had congenital anomaly of newborn otherwise 87.3% had no congenital anomaly of newborn. More than half (51.8%) of the respondent's baby were ≤ 2.5 kg birth weight and 48.2% baby were more than 2.5 kg birth weight. These findings were nearly consistent with the findings of Adolescent Pregnancy Complication and Wastage in Bangladesh. Journal of Nepal Paediatric. Society, 2010 by Rahman MM *et al.* P.[16]

Conclusion

From this study it is revealed that majority anemic women belonged to teenage age group. This study is a small sample size study; further studies with large sample size well establish the actual factors for anemic pregnant women. Nevertheless our results provide the basis for taking necessary measures to aware the mass population and thereby prevent and control anemic pregnant women.

Conflicts of interest. None of the authors have competing interests

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Original Article

Non-Alcoholic Fatty Liver Disease in Pregnancy with Estimation of Feto-Maternal Outcome in a Tertiary Hospital in Bangladesh

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Abstract

Background: Non-alcoholic Fatty Liver Disease (NAFLD) is a growing public health concern globally. NAFLD has been linked with adverse pregnancy outcome. The prevalence of NAFLD among women in childbearing age is 10%. During pregnancy both physiologic and pathologic fluctuation in estrogen as well as rapid weight gain plays an important role in the development of NAFLD in mother and infant.

Objective: To find out clinical and laboratory profile and pregnancy outcome of patients with fatty liver disease.

Methods: We conducted this observational study between January through December 2017 in (pro-women, pro-poor) Ad-din Women Medical College Hospital in Maghbazar, Dhaka, Bangladesh. We enrolled 103 pregnant women who signed the consent (verbal) to participate in the study. Demographic and clinical information was collected using a pre-tested questionnaire.

Results: Mean age of the patients was 27 years. During first trimester 18 patients were enrolled, 32 in second and 53 in third trimesters. Of 103, 3 (2.91%) patients had known history of fatty liver disease, 11 (10.68%) had hypertension, 11 (10.68%) had Gestational Diabetes Mellitus (GDM) but none had previous history of Diabetes Mellitus (DM). Among all, 8 (7.76%) patients had previous pregnancy related complications and 32 (31%) had foetal complications including still birth, abortion, neonatal death and Intrauterine Device (IUD). Beside, 92 (89.3%) had grade 1, 10 (9.7%) had grade 2 and one (0.97%) patient had grade 3 fatty liver. 35 (32.4%) patients had high Fasting Blood Sugar level and 26 (24.1%) patients had positive Oral Glucose Tolerance Test (OGTT). And, 31% patients had a high cholesterol level, none had abnormal HDL, 5.8% had high LDL and 78.6% had high TG. USG identified 3 patients with abnormal fetal profile and only 2 patients had adverse pregnancy outcome: one IUD and one abortion.

Conclusions: Non-alcoholic fatty liver Disease increases the risk of maternal and fetal complications. Pregnant women should regularly screen for fatty liver disease for early detection and intervention.

Key Word: Pregnant women, Non-alcoholic Fatty liver, Fetal, Maternal, Tertiary Hospital

Introduction

Non-alcoholic Fatty Liver Disease (NAFLD) is a growing public health concern globally. Nonalcoholic fatty liver disease (NAFLD) is the most common liver disorder in the Western world, with an estimated prevalence of 20% to 30% in the adult population, 6.67% to 29.85% of whom progress to more advanced nonalcoholic steatohepatitis (NASH).[1,2] NAFLD is also the leading indication for liver transplantation among women.3,4 The prevalence of NAFLD varies by age, sex, ethnicity, modality of diagnosis, and prevalence of obesity in the population.5

NAFLD has been linked with adverse pregnancy outcome. The prevalence of NFALD among women in childbearing age is 10%. During pregnancy both physiologic and pathologic fluctuation in estrogen as well as rapid weight gain plays an important role in the development of NAFLD in mother and infant6. Some recent studies show insulin resistance might act as a subsequent and preceding factor in developing NFALD7-9. Although there are enough studies regarding the harmful effects of maternal hyperglycemia and

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Received Date : 10 January 2022

Accepted Date : 15 February 2022

weight gain on pregnancy and infant health10,11 data related to the effects of NFALD specifically on pregnancy are still not enough.

A study from Canada suggested that the presence of NAFLD as assessed by liver ultrasound at 11–14 weeks of gestation was significantly associated with several adverse outcomes like impaired fasting glucose, gestational impaired glucose tolerance or GDM at 24–28 weeks of gestation12. Another study conducted in Egypt revealed that women with pre-existing NAFLD were at a greater risk of GDM than the women without pre-existing NAFLD13. The prevalence of NAFLD in Bangladesh is 33.86%14 but there are not enough data about the feto-maternal outcome of NAFLD in pregnancy.

The close relationship between GDM and Type 2 DM raises the possibility that a relationship could also exist between NAFLD and GDM. Indeed, prior studies have explored this association, particularly on the postpartum development of NAFLD in women with a prior history of GDM.8, 9, 10, 11 The prevalence of ultrasound-detected hepatic steatosis signifying NAFLD in European women with a prior history of GDM was 38% compared to a prevalence of 17% in women without GDM.8 In Caucasian and Black American women with a previous history of GDM, a higher rate of NAFLD was detected via ultrasound or computerized tomography15

The primary aim of this systematic review and meta-analysis is to determine the prevalence of GDM in women found to have imaging evidence of NAFLD during their pregnancy. A secondary objective is to assess whether a higher occurrence of GDM develops in women with NAFLD compared to those without.

Objectives:

Aim(s) of this study was to find out clinical and laboratory profile and pregnancy outcome of patients with fatty liver disease.

Methodology:

Study design: Observational study.

Study period: Twelve months (January through December 2017)

Study area: Ad-din Women's Medical College and Hospital.

Inclusion criteria were as follows:

i. Pregnant women: Non-alcoholic Fatty Liver

Exclusion criteria were as follows:

i. Non pregnant women
ii. Pregnant women: Alcoholic Fatty Liver

Total Sample sizes: 103 pregnant women.

Maintaining the Quality Control of Data

- To assure the quality of data, each collected data will first be checked visually and rechecked by other investigator and only then it would be entered into an IMP/PC to check for logical checking.
- Data form each patient would be coded before analysis and reporting.

Data Processing and Analysis

- The data will be cleaned, checked for completeness, and then would be entered into SPSS, V. 22 The data will be analyzed using appropriate descriptive statistics, and will be tabulated using frequency, percentage, and mean.
- Both binary & multivariable logistic regression analyses will be performed. Variables in bi-variable analysis with $p< 0.2$ will be entered into a model of multivariable logistic regression.
- The strength of association of risk factors with knowledge and practice will be demonstrated by computing crude odds ratio (COR) and the adjusted odds ratio (AOR) with a 95% confidence interval (CI).
- All through the data analysis, a P-value <0.05 will be considered as statistically significant.

Results & Findings:

Table-1: Three stages during Pregnancy of enrolled pregnant women (n=103)

Three stages during Pregnancy	Frequency	Percentage
First Trimester	18	17
Second Trimester	32	31
Third Trimester	53	52

Table 1 shows that among 103 patients 18 (17%) patients were enrolled during first trimester, 32 (31%) in second and 53 (52%) in third trimesters.

Table-2: Previous history of various diseases among pregnant women (n=103)

Diseases	Frequency	Percentage
Fatty Liver	3	3
Hypertension	11	10
Gestational Diabetes Mellitus	11	10
No disease	78	77

Table 2 shows that Of 103, 3 (2.91%) patients had known history of fatty liver disease, 11 (10.68%) had hypertension, 11 (10.68%) had Gestational Diabetes Mellitus but none had previous history of Diabetes Mellitus. And, 78 (77%) had no previous history of disease.

Table-3: Previous pregnancy and fetal related complication among pregnant women (n=103)

Previous Complication	Frequency	Percentage
Previous pregnancy related complication	8	8
Previous fetal complications	32	31
None	63	64

Table 3 shows that of 103 patients, 8 (7.76%) patients had previous pregnancy related complications and 32 (31%) had fetal complications including still birth, abortion, neonatal death and intrauterine death (IUD).

Table-4: Fatty liver grade level among pregnant women (n=103)

Grade Level	Frequency	Percentage
Grade-1	92	89.3
Grade-2	10	9.7
Grade-3	1	0.9

Table 4 shows that 92 (89.3%) had grade 1, 10 (9.7%) had grade 2 and one (0.97%) patient had grade 3 fatty liver.

Table-5: Blood sugar level among pregnant women (n=103)

Blood Sugar Level	Frequency	Percentage
High Fasting Blood Sugar Level	35	32.4
OGTT	26	24.1
None	42	40.2

Table 5 shows that 35 (32.4%) patients had high Fasting Blood Sugar level and 26 (24.1%) patients had positive Oral Glucose Tolerance Test (OGTT).

Table-6: Cholesterol level status of pregnant women

Cholesterol Level	Frequency	Percentage
High	34	31
LDL	6	5.8
High TG	81	78.6

Table 6 shows that of all patients 31% (34/103) patients had a high cholesterol level, none had abnormal High-Density Lipid (HDL), 5.8% (6/103) had high Low-Density Lipid (LDL) and 78.6% (81/103) had high Triglyceride (TG) level.

Discussion:

Non-alcoholic fatty liver disease may be characterized by hepatic steatosis on imaging or biopsy, insulin resistance and increased triglyceride synthesis[16]. NFALD is itself an insulin resistance state[17]. As the pregnancy advances to third trimester, insulin sensitivity might decline to 50% of the normal expected value[18] making the situation even worse.

Study showed that 2.91% patients had known history of fatty liver disease, 10.68% had hypertension, 10.68% had GDM but none had previous history of DM. Higher BMI (>30 as opposed to <25) and the more established diabetic state DM as opposed to GDM) groups have shown a stronger association with NAFLD in pregnancy.[19] Previous studies demonstrated a strong link between both gestational diabetes and NAFLD. [8]

Ajmera et al. showed that GDM is an early risk indicator for the occurrence of NAFLD in multiparous women.[7] A meta-analysis evidenced that NAFLD is independently associated with a significant increase in maternal conditions of baseline HTN and DM, obesity, GDM, history of GDM, pre-eclampsia, and composite outcomes of hypertensive complications of pregnancy.[19] Two studies from Europe evaluated other markers of fatty liver among women with GDM. [7]

Another finding showed that 7.76% patients had previous pregnancy related complications and 31% had fetal complications including still birth, abortion, neonatal death and IUD. NAFLD in pregnancy is associated with fetal outcomes, with significantly higher odds of premature birth, a novel significant association

with a history of abortion or miscarriage and large for gestational age birth. [19]

Study showed that of all patients 31% (34/103) patients had a high cholesterol level, none had abnormal High-Density Lipid (HDL), 5.8% (6/103) had high Low-Density Lipid (LDL) and 78.6% (81/103) had high Triglyceride (TG) level. Although previous studies demonstrated that infants of pregnant NAFLD women had a higher incidence of preterm birth with low weight. [7]

The prevalence of NAFLD in pregnancy has increased almost threefold in the last decade and it is associated with various complications like hypertensive complications, postpartum hemorrhage and pre-term birth. [20]

Conclusion:

Non-alcoholic fatty liver Disease increases the risk of maternal and fetal complications. This study will help to pregnant NAFLD patients to be educated about the long-term squeal of this metabolic condition Pregnant women should regularly screen for fatty liver disease for early detection and intervention.

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Case Report

Steps of Distal Radical Gastrectomy for Carcinoma of the antrum and Roux-en-Y gastro-jejunostomy: A case presentation

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Abstract

A 75 year old man presented with gastric outlet obstruction with a history of vomiting and weight loss for a period of 4 months. He had severe electrolyte imbalance, anemia and malnutrition. CT-scan revealed a huge antral carcinoma occupying the distal half of stomach. Firstly, his anemia and electrolyte imbalance was corrected, followed by preoperative parenteral nutrition. Stapler assisted distal radical gastrostomy and Roux-y gastro-jejunostomy was performed. The patient had excellent post-operative recovery. He was discharged on resumption of oral feeding and referred to the oncologist for adjuvant therapy. This case report, is on steps of stapler assisted distal radical gastrectomy with high resolution operative picture from the Department of Surgery, AWMCH.

Key words: Antral carcinoma, distal radical gastrectomy, Bill Roth -II gastro-jejunostomy, Roux-en-Y gastro-jejunostomy.

Introduction

Gastric cancer (GC) remains a highly malignant tumor with limited therapeutic effect. According to latest statistics of over one million new cases diagnosed worldwide, GC ranked as the 5th most common cancer and fourth most aggressive type with lethal characteristics.[1] In the past few decades, a great progress has been made in it's treatment, where radical surgical resection remains the only potential curative option.[2] For most GC cases located in the middle and lower third of the stomach, particularly in the antrum and lesser curvature, distal gastrectomy (resection of the distal two-thirds of the stomach and anastomosis of the proximal stomach to the small bowel) has been recommended.[3] Various reconstruction methods after distal radical gastrectomy have also been introduced. But, the preferred approach still remains controversial. We report here, a simplified, yet, safe technique of Roux-en-Y anastomosis using linear cutter stapler.

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Received Date : 02 October, 2021
Accepted Date : 25 December, 2021

The Case Details

A 75 year old man attended our surgery Dept. with vomiting and weight loss for 4 months. He had generalized weakness, anemia, malnutrition, hypo-natremia, hypokalemia and hypoalbuminemia. On examination, a palpable lump in the epigastrium was found. Upper GI endoscopy could not be performed due to his insubstantial condition. CT scan of the whole abdomen with oral and intra-venous contrast revealed a large growth in the distal stomach occupying the lower half. There was no evidence of liver metastasis. The patient was prepared for surgery with gastric lavage, correction of anemia, correction of electrolyte imbalance and parenteral nutrition support.

Surgical Technique/ Procedure followed

Abdomen was opened by upper midline incision. A huge antral tumor (Malignant Cancer) was found occupying the lower half of the stomach. The tumor was mobile and operable. No liver or peritoneal metastasis was detected. Distal radical Gastrectomy (DG) with Roux-en-Y gastro-jejunostomy was planned, especially for such small gastric segment. Two-third of distal stomach was mobilized and was de-vascularized with liga-sure and vicryl ligature. Duodenum was transected from the tumor by blue cartridge linear cutter stapler (Auto-suture) as shown in Fig-1.

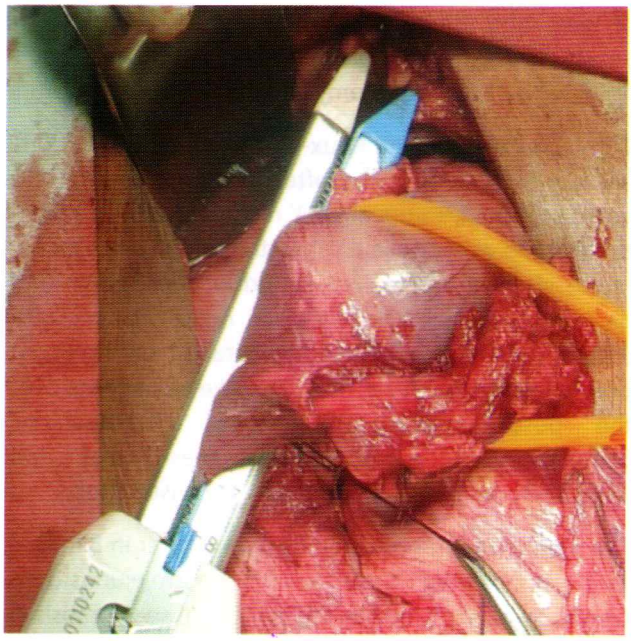

Fig-1: Application of Linear stapler (Blue cartridge) between duodenum and the tumor

The duodenal stump was further reinforced with horizontal mattress suture with vicryl. The upper one-third of the stomach was divided from the tumor by two green cartridge linear cutter stapler which has been shown consequently in Fig-2 followed by 3 and 4.

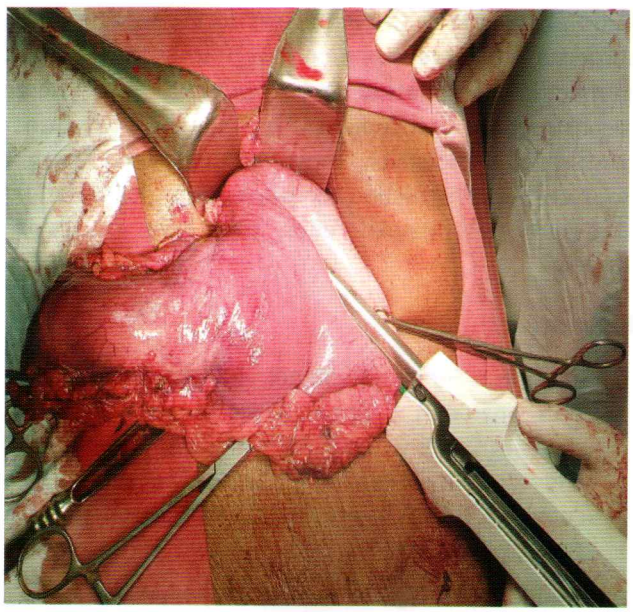

Fig-2: Application of linear stapler with green cartridge between the body of the stomach and the tumor with adequate healthy margin.

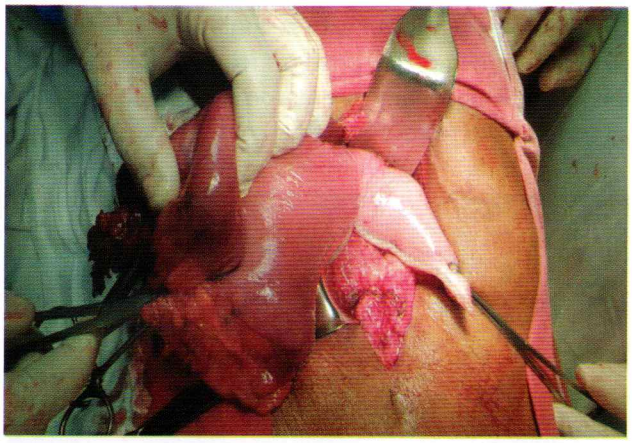

Fig-3: Partial division between the healthy gastric remnants and the tumor, another stapler was used to complete the division (Not shown in the picture).

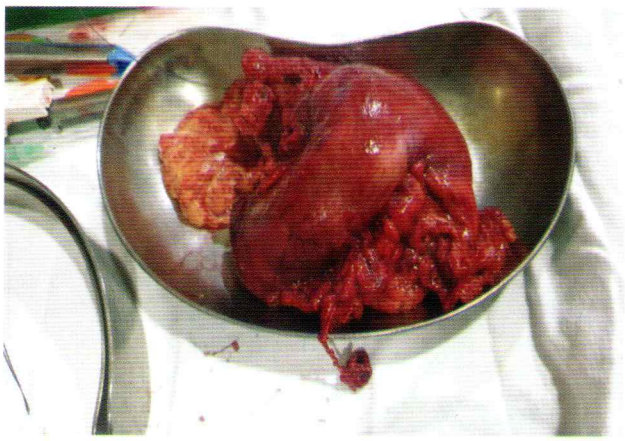

Fig-4: Resected stomach with the tumor

The jejunum was divided 30 cm distal to the Dusteno-Jejunal flexure. The Proximal Roux loop was anastomosed with the stomach segment with a blue cartridge linear cutter stapler demonstrated in Fig-5.

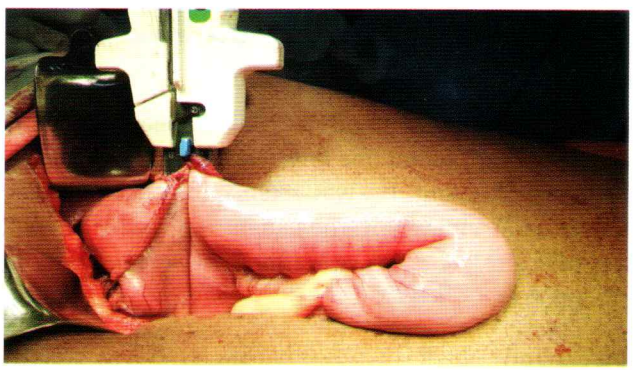

Fig-5: Anastomosis between the gastric remnant and a Roux-loop of the Jejunum with a blue cartridge

The window was closed with a single layer interrupted vicryl suture, (Fig-6). The proximal jejunum was joined to the Roux-loop by end-to-side jejuno-jejunal anastomosis to restore intestinal continuity, (Fig-7).

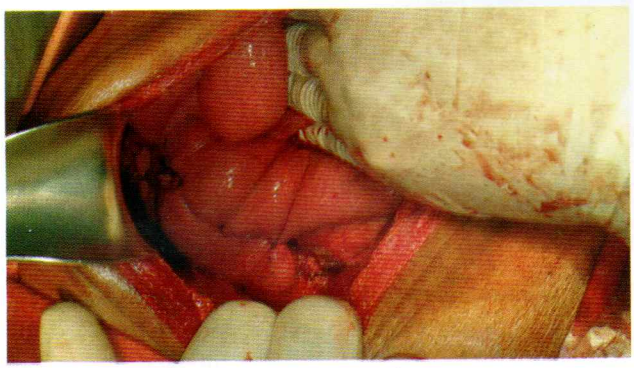

Fig-6: Gastro-Jeujunostomy suture line

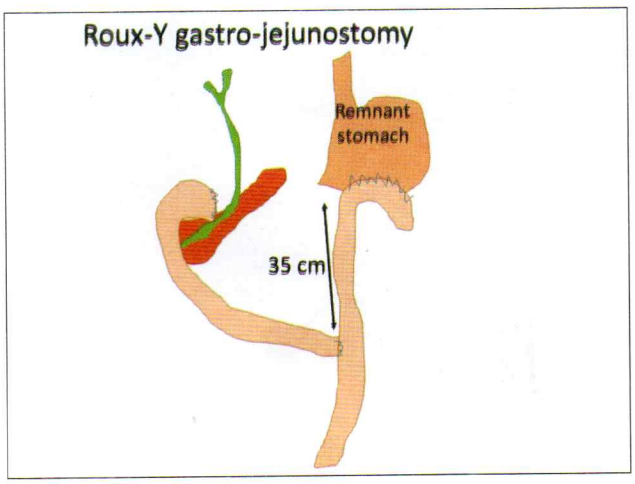

Fig-7: Diagrammatic picture of Roux-Y Gastro-jejunostomy after distal radical gastrectomy.

Post-operative management and timeline

The patient stayed in ICU for 5 days with the support of total parenteral nutrition. Oral feeding was resumed on 7th post-operative day. He was discharged from the hospital on 9th post-operative day.

Histopathology confirmed well differentiated adeno-carcinoma with tumor free resection margin; with lymph nodes involvement. He was referred to oncologist for further adjuvant therapy. The patient was discharge with the advice of follow up visit after 2 weeks to reveal his condition fine.

Discussion

Several studies revealed that stapled anastomosis is superior to the manual hand-sewn anastomosis in terms of operating time and hospital stay.[4-5] So, stapled anastomosis is a preferable than hand-sewn anastomosis for distal radical gastrectomy and Roux-Y reconstruction.

Currently, Bilroth-II and Roux-en-Y (R-Y) reconstructions are commonly performed after distal gastrectomy for gastric cancer. Traditionally R-Y reconstruction has been the method of choice in total gastrectomy [6] and is being increasingly used to prevent duodeno-gastric and gastro-esophageal reflux in distal radical gastrectomy (DG) also.[7-8] The potential advantages of improved post-operative quality of life (QOL) take precedence over the possible increased risk of post-operative complications due to multiple anastomoses and increased operating time in Roux -Y reconstruction.

The operating time was significantly shorter in Bilroth-II gastrojejunostomy than Roux-Y gastrojejunostomy, which can be explained by the additional anastomosis in R-Y reconstruction. However, no difference was reported in the rate of anastomotic leak within the two types of gastro-jejunostomy after the DG surgery. It may be largely due to the use of gastrointestinal stapling devices and the refinement of technique.[9] The Roux-Y reconstruction following the DG surgery is superior to Bill Roth-II reconstruction. This prevents bile reflux, segment gastritis and reflux esophagitis too, as it reduces duodena-gastric and gastro esophageal reflux. [10-11]

Conclusion

Currently, Bilroth-II and Roux-en-Y (R-Y) reconstructive surgeries are more commonly performed after distal gastrectomy for gastric cancer but which of these reconstruction procedures is superior remains controversial. However, most of the study favors Roux-en-Y reconstruction for prevention of bile reflux and gastro esophageal reflux, thus save a revision surgery.

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Review Article

Trailing Nocardiosis- A Non-healing Wound Infection: Where does Bangladesh stand? An Updated Review!

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Introduction

Organisms of the genus Nocardia are associated with the microorganisms known as the actinomycetes and belong to the family Mycobacteriaceae. Nocardia causes a variety of illnesses in humans and other mammals. It normally enters the body via the airways, but may also be directly inoculated into the skin, causing primary cutaneous disease. Nocardiosis is thought to be an uncommon bacterial infection with a wide variety of clinical manifestations in immunocompromised patients. The number of cases is not reported frequently but is increasing, yet the literature for nocardiosis still remains limited in Bangladesh. Thus, this updated review with open up a new horizon for nocardiosis with its detailed clinico-epidemiological characteristics-that may help our clinician and medical researchers expand their horizons too.

Background

To identify any pathogen associated with long term non-healing wound infections, it can often be a great decision to keep a high index of suspicion directed towards 'Nocardia', a weakly acid-fast bacilli that is typically found among immune-compromised patients.[1, 2]

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Received Date : 15 November, 2021

Accepted Date : 20 February, 2022

Nocardia has more than a 100 identified species, of which 54 species remain pathogenic to humans.[3,4,2] This ubiquitous pathogen Nocardiae is commonly found in the environment of tropical and subtropical countries, making exposure to this acid fast bacilli unavoidable.

And yet, it has been scarcely reported from Bangladesh where we studied this infection in patients first in 2017, and again in 2021, was revealed in immune- competent patient's too.[5, 6]

Nocardia is overlooked owing to the existence of more well-known acid-fast bacilli of the same family, the infamous 'Mycobacterium tuberculosis' in a high TB-burdened country like Bangladesh, and this situation is similar to other developing countries.

So, this review is aimed at describing and updating information on both the Nocardia & the infection caused by it- 'Nocardiosis'. The following has been addressed in this updated review:

i) Latest clinico-epidemiological aspects of Nocardiosis.

ii) Laboratory aspects

iii) Updated diagnostic approach

iv) Latest attempt to enrich/upgrade the issues of Prevalence of Nocardia spp. causing non-healing-wound infections, and, finally-

v) Focused brief activities on Nocardiosis in randomly selected districts in Bangladesh (including a short project submitted at the Ministry of Health & Family Welfare for funding, last year)

Methodology of this Updated Review:

We followed the standard format of writing up a systematic review, with slight modifications and/or short cuts that does not hamper neither in the quality of this updated review nor leaving out any crucial or relevant information required to write this updated review on nocardiosis caused by an ubiquitous filamentous pathogen/bacteria 'Nocardia'

This systematic review critically synthesizes literature on many details on Nocardia.

Strategy of Literature Search and Selection Criteria of Published Articles

I. Search Engines Utilized:

The following 9 (nine) **search engines** were utilized in preparing this updated review, as practicable:

1) **Google/ Scholar**
2) **PubMed**
3) **Elsevier:** Introduced in 2000 **it remains the 1st academic search engine** that mixed up authoritative sources such as publisher platforms & open access repositories with a deep crawl of academic web pages
4) **EM-BASE** Embase.com are two search engines that are commonly used for searching the

   Medline and Embase databases which remains a standard of practice to conduct a search for a systematic literature review
5) **Cochrane** (accessed through HINARI)
6) **CINAHL** (accessed through HINARI)
7) **Scopus** (accessed through HINARI)
8) **MEDLINE** (accessed through EM-Base, Scopus, Cochrane and HINARI)
9) **HINARI** (Capacity Building Resource): launched in 2002, provides access to key databases viz., PubMed (full text), Cochrane, CINAHL, and Scopus. HINAR remains now one of the primary portals accessed by researchers and clinicians particularly in developing countries.

II. Year specific published literature was searched over the last 10 years:

Starting from **as early as 2013** through the **latest period of 2023** (updated)

III. Key words used to find out pertinent published literature

Nocardia subject headings were used in the execution of PubMed and MEDLINE searches. Search terms related to nocardiosis included "global scenario", "Prevalence of Bangladesh", "clinico-epidemiological aspect", "laboratory aspect". "diagnosis". Google Scholar was used to obtain additional articles identified by journal hand searching.

IV. Data basing:

All database search results were imported into EndNote. Duplicate entries were removed before screening. Data were extracted by using a table developed by the research team. Data extracted included author, year, country, aim, research design, sample, participants, and relevant findings. Relevant findings were those that related to the inclusion criteria, including nocardiosis, global scenario, Prevalence of Bangladesh, clinico-epidemiological aspect, laboratory aspect, diagnosis. To ensure accuracy, another investigator cross-checked the extracted data of all included studies using the full-text study.

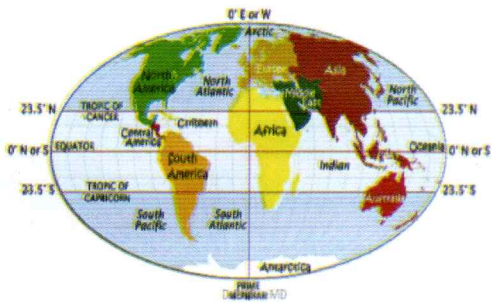
Results and Findings:

Global Prevalence of Nocardia and its Existence in the Environment

Nocardia :ECOLOGY& EPIDEMIOLOGY

- Ubiquitous environmental saprophyte
- Soil, organic matter, water
- Tropical and subtropical regions

:Mexico, Central and South America, Africa and India



Studies from different countries have demonstrated that *Nocardia* infection among non-immune-compromised people is usually seen in agricultural workers, or patients with history of surgery, trauma and poor hygienic practices etc.[7,8,9]

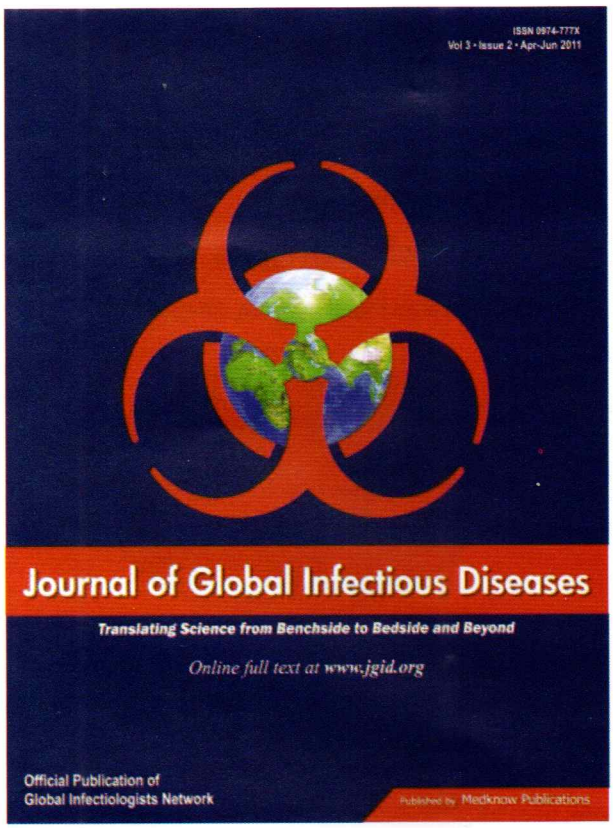
One such retrospective study was conducted in a tertiary care hospital in Saudi Arabia and is given in brief as follows:

Nocardiosis in a Tertiary Care Hospital in Saudi Arabia

The prevalence of Nocardia infection in Saudi Arabia is not known. Sporadic cases of Nocardia infection causing mycetoma have been reported from the northwest region. Recently, the Kingdom of Saudi Arabia has become a leading center for solid organ and bone marrow transplantations in the Middle East. Infection with this opportunistic pathogen is expected to become more prevalent. Hamdan Al-Jahdali et. al. performed a 10-year retrospective review of all cases of nocardiosis identified at the King Fahad National Guard Hospital in Riyadh. Clinical presentation, risk factors, site of disease involvement, radiological features, and outcomes of 30 patients with pulmonary and disseminated nocardiosis are presented.

Materials and Methods: A retrospective chart review of all cases of nocardiosis over the last ten years.

Results: Thirty cases of nocardiosis were identified. The disease was more common in males. Fever and cough was the most common presentation. Most of the patients had an underlying pulmonary disease.



Conclusion: Nocardiosis is not uncommon in Saudi Arabia. Cases are not restricted to the classical immunocompromised host. A database is urgently needed to better evaluate the prevalence of the illness among the Saudi population.

Geographical areas and countries covered (from published literature)

Which included computerized searches, ancestry searching, and journal hand searching to ensure the inclusion of all eligible studies. The studies included quantitative studies and qualitative studies from (India, Pakistan, Malaysia, Ghana, Lithuania, Iran, Albania but in rich countries (UAE, Saudi Arabia) including in western ones (Canada, USA, etc.).

Prevalence in Bangladesh

The actual prevalence of Nocardiosis in Bangladesh may be underreported due to grossly limited lab facilities to diagnose this pathogen, clinicians' low index of suspicion of Nocardiosis in a Tuberculosis-prone country, and the extended time to yield this bacilli's growth leading to contamination which obscures its presence.[6]

However, researchers from other countries have reported similar findings in Bangladesh (29%) or higher occurrence of Nocardiosis (up to 40%) among immunocompetent in other countries. [5,9,10]

In healthy people, Nocardiosis is commonly found primarily in skin/ muco-cutaneous or lung infections as reported from Bangladesh.[11,12] For immune deficient people, it can invade any organ of the body which may eventually lead to fatal conditions such as sepsis, bone and brain infection; mortality ranging from 20 to 30% in disseminated infection and 50% in CNS involvement, as found in other countries.[13]

Existing Dilemma: How is Nocardia missed?

Histopathological findings of Nocardia infections mimic the granulomatous lesion of Tuberculosis (TB) and therefore, often treated with antitubercular drugs which ultimately fails to cure Nocardia spp.[14, 15] The patient with non-healing wound infection due to Nocardiosis suffers from waning health for years which heals and again re-emerges as discharging sinuses in and around the site of the inoculation of the organism if misdiagnosed and empirically treated with broad spectrum antibiotics.[5]

In a TB-burdened country like Bangladesh, majority of Nocardial infections go unsuspected by clinicians owing

to its nonspecific clinical picture. Furthermore, if clinicians do not suspect and request for *Nocardia/ Actinomyces* identification or if it is not mentioned on the requisition form, microbiologists may miss the organism due to several reasons. viz. :

- The ***Nocardiae* often becomes Gram negative** and **non-acid fast** depending on the **cell wall components, old culture, staining procedure** etc.,
- Its culture needs extended incubation from minimum 3 days to weeks which may dry the media or yield the growth of other flora before *Nocardiae* is able to grow, and considered as no growth/ contaminant.
- Their colonies are usually very small in size initially, dry with aerials, and show chalky white color turning gradually to orange which often may be considered as **contaminant.** [2, 12,16]
- Moreover, ***Nocardiae* diagnosis in the microbiology laboratory is hampered and therefore underreported due to extended time demand for satisfactory growth.** [17] In absence of selective media, growth recovery requires multiple subcultures and repeated observation of many slides to clinch the diagnosis.

Lutfor et. al., 2021 illustrates the case of a 32-year-old man who presented with a chronic discharging sinus in the neck and had a history of excisional biopsy at this site a few years earlier. Based on the histopathological findings, he had been on an anti-TB regimen for more than a year, followed by multiple antibiotic courses with no improvement. The culture from the sinus revealed Nocardia, and treatment with Doxycycline was started, after which the lesion healed after a year.

Another case is of a 30 year old who underwent lower uterine caesarean section (LUCS) half a year ago, had a five-month-old discharging sinus, with a pocket under the skin, situated above the caesarean wound. A complete regimen of anti-TB drugs did not heal the sinus. Nocardia spp. was isolated from the sinus, and a regimen of amoxicillin-clavulanic acid for 6 months healed the wound.[6]

It is to be noted that Nocardia spp. can cause an acute primary infection which later on may become chronic where the organism remains hidden in a pocket behind the afflicted tissue. This is not easily discernible and leads to unsatisfactory collection of specimens if the collector is not aware or not adequately trained.

Specimen requires meticulous microscopy by experts to exclude *Actinomyces* spp. and fungi by Gram stain and confirm *Nocardia* spp. by modified Ziehl Neelsen (MZN) stain, from their slow growth on artificial culture media.[2,5,6]

Diagnosis of Nocardiae

In the light of currently available methodologies that can provide accurate and rapid results on diagnosis or speciation (gene sequencing and matrix-assisted laser desorption ionization–time of flight mass spectrometry [MALDI-TOF MS]), the use of biochemical testing is neither accurate nor timely. Molecular methodologies, specifically, gene sequencing, have become the most accurate technique to definitively identify Nocardia to the species level. [12]

Diagnosis can be done from a quality specimen by diligent microscopy of traditional Gram stain and modified Ziehl-Neelsen (MZN) staining as well as from growth in extended incubation.[6] Genus level identification for drug susceptibility testing is thought to be sufficient for appropriate treatment.[7, 2]

Studies on Nocardiosis in Bangladesh: Another step ahead!

Despite its ubiquity, reported data and/or published articles remain very scarce in Bangladesh, so far only **three** studies on Nocardiosis have been reported from **Bangladesh** :notably two by Prof. **Afzalunnessa Binte Lutfor, which was p**ublished in **2017, and in** an internationally reputed journal in 2021, and earlier in **2012 when** a group of icddr, b scientists published a study in BJCH. This reveals that neither earlier nor in recent days had Nocardia been studied well in this country.

However, the Microbiology laboratory of Ad-din Women's Medical College Hospital (AWMCH) confirmed the presence of *Nocardia* in patients who suffered from festering infections having non-healing discharging sinuses, for a period of months to years.

Study at AWMCH also found that *Nocardiosis* patients had taken courses of antibiotics, specially anti-tubercular and/or antifungal drugs prior to diagnosis, with no improvement. But after a proper diagnosis they were cured with a single appropriate antimicrobial regimen.[6]

Treatment of *Nocardia*

Nocardia needs a course of appropriate antibiotics (minimum 6 months to 2 years)[14] making it an important pathogen which should not be missed out by the

microbiologists or clinicians in order to reduce the suffering of patients. [18,19]

We also have to keep in mind that antimicrobial susceptibility is changing: a rising trend of resistance to commonly used drugs especially cephalosporins has been reported by different authors [20, 21, 22] including us.[5,6] The variations in susceptibility patterns among different species of Nocardia have also been documented in earlier studies.

Not much is known about the genetic basis of resistance in Nocardia, but alarming findings suggest that Nocardia isolates are capable of and already have acquired mobile elements carrying resistance conferring alleles. [20] Therefore, it is imperative to exercise caution by using dedicated equipment in laboratories while conducting Nocardia diagnosis.

Impact of conducting research on Nocardia in tier specific localities in Bangladesh (upazilla, district, divisional and country level)

*Properly identified *Nocardia* spp. will encourage microbiologists in lab diagnosis

*Updated data will motivate clinicians to confidently suspect Nocardiosis more, where applicable.

*Accurate findings, early diagnosis and optimum treatment of Nocardiosis will assist in reducing patients' sufferings.

*Capacity building of more microbiologists to be oriented in identifying Nocardia

*Capacity building to assist conducting epidemiological research to create a prudent database both at the local, district & national level.

*Utilizing the aforementioned database to optimize rational treatment leading to proper antibiotic use and prevention of MDR from antibiotic misuse.

Thus, timely and enhanced research on Nocardiosis, for microbiologists, clinicians and patients, needs to be conducted.

In Conclusion

In non healing surgical-wounds infection with noncardia spp. should be considered. If Nocardia remains undiagnosed and improperly treated, empirical use of antimicrobials will contribute to increased resistance and further subject the patient to more cycles of treatment failure. Thus, proper case diagnosis and treatment with prudently selected antibiotics according to susceptibility pattern will bring an end to the physical sufferings, psychological miseries and financial burdens of the patient. Therefore, the determination of the prevalence of Nocardiosis in Bangladesh will highlight the neglected yet clinically challenging problem.

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Review Article

Scabies- Major Childhood Skin Infestation in Bangladesh- An Updated Review

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Abstract

Background: Globally distributed scabies- a highly prevalent contagious skin disease particularly infests children and elderly population. Since scabies often remain un-recognized/un-diagnosed or under-reported, but >130 million people suffer from scabies, WHO listed it under neglected tropical disease (NTD).

Objective(s): This updated review focus on scabies etiology and association with socio-economic profile, water sanitation, personal hygiene, poor living condition, and environmental pollution. However, few plausible risk factors of childhood scabies have also been covered in this review.

Methodology: A through computer-based literature search was performed for the period of ~two decades (2000 through 2022) utilizing four familiar search engines: Google Scholar, PubMed, Scopus and Elsevier. The search topics covered: 'childhood/adult scabies', 'etiology', 'risk factors', 'monthly income', 'water sanitation 'personal hygiene', 'living conditions' and few others (optional).

Findings: Of total 28 published articles reviewed conducted in major lower/mid income countries (LMICs) including some rich and Western ones. Overall findings revealed <12 years-old children were infested more, which was reported in more higher portions from Bangladesh alike other Afro-Asian countries. Scabies is attributed to overcrowded lower socioeconomic community, lack in knowledge/practice of poor personal hygiene, polluted environment/water-sanitation. Clinically, it is associated with intense generalized pruritus causing rash, itching/scratching, particularly during winter season. One of our community-based studies in residential Madrasahs in and around Dhak city/outskirts yielded that sharing habits of daily personal belongings (personal clothing, bed linen /towels, pajamas/lungis, etc.) were main sources of scabies transmission/scabies mite: *Sarcoptes Scabiei*. Alike our observations, treatment of scabies included Lot. Benzyl benzoate, Monosulfirum cream/soap, Permethrin cream, and, Lot. Ivermectin/cream for severe cases as best effective drugs to eradicate scabies mites which most of the literature agreed to irradicate scabies in ~90% children.

Conclusion: Scabies, more in children and elderly people, remains associated with overcrowding, bizarre living, moist/stuffy environment, poor personal hygiene, sharing personal cloths/towels, including other factors like parental sociodemographic status and poorer household income. Public Health policy makers should address immediate intervention to mitigate these factors to ensure effective prevention and control of scabies, both among the children and elderly people.

Key words: Childhood Scabies, Etiology, Re-infection, Risk factors, Prevention, Control, Treatment, Bangladesh

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Received Date : 24 March, 2022
Accepted Date : 10 April, 2022

1. Introduction:

Scabies is mostly a tropically endemic skin infestation being one of the most contagious diseases in the world for centuries, flaring up as large epidemics. Occurrence of scabies is related to low socio-economic conditions, overcrowding, poor personal hygiene and social disruptions (violence, wars etc.). Since scabies- a contagious disease has a considerably high prevalence rate.[1] Thus, scabies has been enlisted in WHO-listed neglected tropical disease (NTD) since 2017, although it often remains un/under-diagnosed, un-reported and so keeping this communicable skin disease un-recognized, globally. That's why, WHO adopted scabies under NTD-roadmap 2021–2030, aiming to seize ignoring it which would boost attaining UN's universal goal of SDG (Sustainable Development Goal),[1] where Bangladesh remains a signatory of it, too.

Discomfort of often-intractable itching, remains one of the important precursors for systemic bacterial sepsis often leading to post-streptococcal glomerulonephritis as secondary bacterial /pyoderma. In addition to clinical signs/symptoms, definitive diagnosis of scabies needs microscopic visualization of mites/borrows from skin scrapping, though treatment is often given on clinical suspicion being more common. Endemic scabies is reported from areas lacking in facilities of clinical care and treatment in many Afro-Asian and Latino countries including Bangladesh.[2-4]

2. Background:

2.1 The Parasitic skin infestation-scabies

Human scabies is a parasitic infestation caused by *Sarcoptes scabiei* var hominis. The microscopic mite burrows into the skin and lays eggs, eventually triggering a host immune response that leads to intense itching and rash.[5] Scabies infestation may be complicated by bacterial infection, leading to the development of skin sores that, in turn, may lead to the development of more serious consequences such as septicemia, heart disease and chronic kidney disease.[6]

Scabies is one of the most contagious skin diseases in Bangladesh being more who lives in overcrowded places, in close contact and share personal belongings (cloth; gamcha/towel, bed sheet /linens) that helps transmitting scabies mites more easily. Further scabies occurs more among people having unhealthy living style, poor personal hygiene, polluted water sanitation and families under poverty, which remains plausible risk factors of infesting with scabies.[7] More detailed scenarios on etiology, clinical spectrum, epidemiology of Scabies including its **prevention and control** are described below (sections 2.2 through 2.5)

2.2 Etiological background of scabies:

Scabies is more common among lower socio-economic communities who live in dirty/squalid surrounding, unhealthy environment, and in overcrowded areas. It is also more common among people with poor personal hygiene due to poor water sanitation, low household budget, lack of cleanliness and unhygienic housing and living conditions.[3, 5, 7]

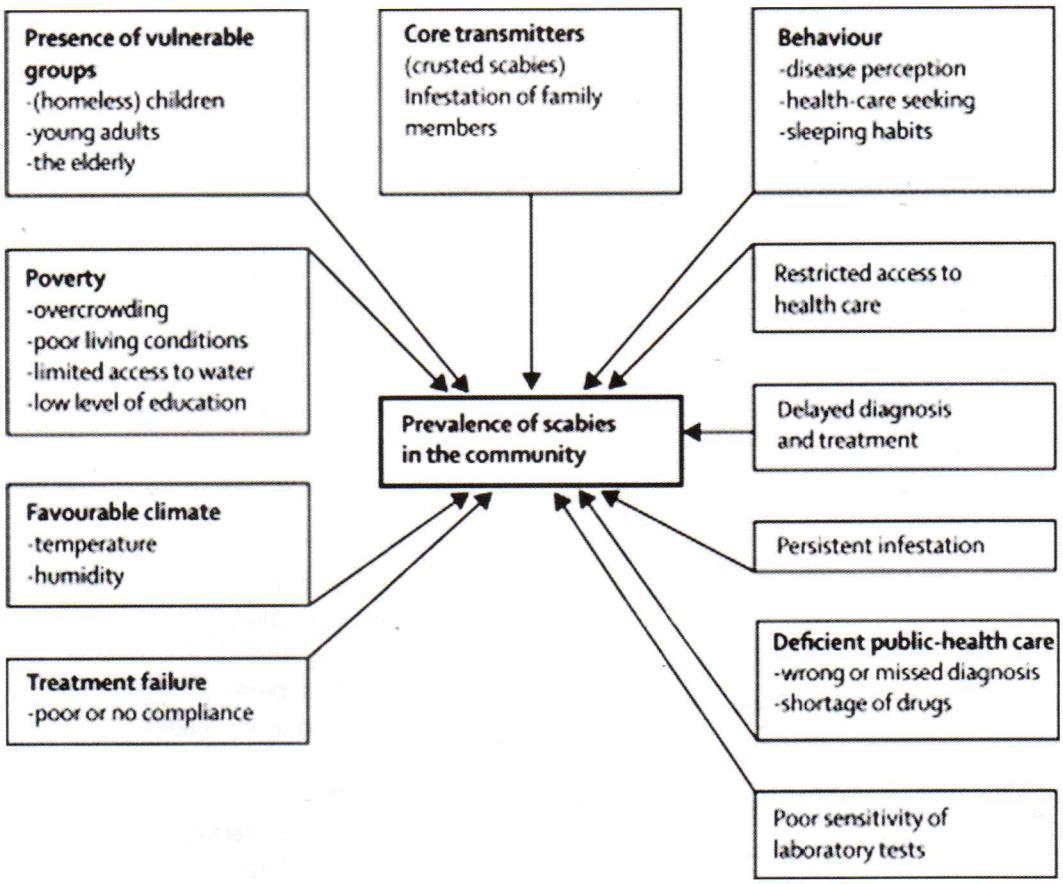

Figure-1: *Factors contributing to a high prevalence of scabies in resource-poor communitiesies*[6]

Most of the research on scabies has been carried out in urban settings, and has focused on the prevalence or clinical aspects of scabies. Since clinic-epidemiological data (particularly socio-economic aspects) on scabies largely lack in most rural communities, generation of such data, particularly on institutional outbreaks may be left out or some cases remain unidentified or untreated, as we observed in most residential Madrasahs where no or few studies on scabies were conducted.[7]

2.3 How the scabies mite looks under microscope

Scabies mite (Sarcoptes Scabiei) is too tiny to see with naked eyes. Their lengths are only about half of a millimeter, which includes eight legs, among them the anterior four are large in size and used for digging into the skin of an individual, and the posterior four are much smaller. They can also use their mouth as suction for holding on to human skin.[5] Figure- 2 below demonstrates the how the scabies mite Sarcoptes Scabiei looks like to infest human beings causing a wide range of dermatological lesions.[4]

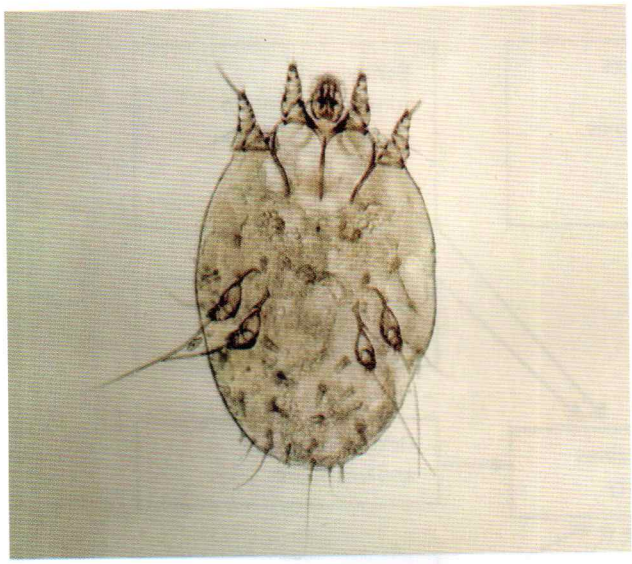

Figure-2: Microscopic vies of *Sarcoptes Scabiei* the scabies mite that hatch eggs on the skin surface (epidermis) [8]

2.4 Clinico-epidemiological aspect of Scabies

The microscopic skin parasite known by its scientific name as *Sarcoptes scabiei'* is called as scabies mite- which not only makes infestation into human skin but also make infections. Scabies mites are not visible on naked eyes. They infest on the top most layers of skin, where they lay their eggs and reproduce. This causes immune reaction of varied severity from skin infestation to inflammation that results in red bumps and rashes, associated with intense itching and a wide range of infections.[9,10]

2.5 Prevention and Control of Scabies:

Since Scabies is highly contagious a skin disease (infestation ➔infections ➔Complications) prevention remains the basic principle for limiting scabies including the control of this disease, towards destroying, or irradiating *Sarcoptes scabiei*, the scabies mites.

Yet, successful prevention and management rely on scabies mite eradication in ~90% children- as our institutional based findings after two rounds of successive treatment.

According to WHO (2005) basic recommendations has been suggested for improving hygiene and sanitation as the most likely means to benefit from scabies, as Rod J Hay reported.[11] Thus, considering prevention of childhood scabies, basic recommendations is to improve hygiene and sanitation, and avoiding overcrowding living, bizarre sleeping and not sharing personal belongings (dresses, towels, bedding, linens, etc.)

Since scabies has been reported to directly associate with poverty/ less monthly household income, it automatically raises the question on the feasibility/cost-effectiveness of associated measures which seem necessary to obtain a significant impact to avoid scabies from affected communities. Due to severe budgetary constraints and lack of mass-awareness on the etiology, transmission and prevention of scabies effective public health intervention through mass training and awareness building deem essential almost in all developing countries to get rid of scabies, permanently.

3. Aims/Objectives:

Based on reviewing selected existing literature this study aim to evaluate the etiology and plausible risk factors of scabies, including the socio-economic profile, water sanitation facilities, personal hygiene, living conditions that reportedly aggravate childhood scabies.

4. Methodology

4.1 Study design: Retrospective study (based on reviewing charts/data and/or related info/map) nearly similar to that of a systemic review).

4.2 Literature Review Matrix: A literature review matrix serves a researcher to help organizing one's thoughts on an article/ literature. This is only one option of many that can help you organize your thoughts; can easily change first section to reflect the write up [12]

4.3 Study type: Updated review article on childhood scabies

4.4 Information/ data-retrieval mechanism: Finding out literatures, review articles, original articles, journals, case reports from the following search engines:

- Google scholar = 25
- PubMed = 10
- Scopus = 5
- Elsevier = 4

4.5 Searching literature for the period from 2000 through 2022.

4.6 Countries where study was conducted: Mainly global but prioritizing Bangladesh.

4.7 Subject headings: 'Childhoods Scabies: clinico-epidemiology, housing environmental aspects, no. of family members/house, family income, poverty status, etc.

4.8 Selection of scabies endemic countries: Studies included review article quantitative studies, qualitative studies, from India, Pakistan, Malaysia, Ghana, Lithuania, Iran, Albania but in rich countries (UAE, Saudi Arabia) including in western ones (Canada, USA, etc.).

4.9 Search terms were related to scabies included "children", etiology", "and risk factors", "water sanitation". Search terms for the topic of interest included "personal hygiene", "global scenario", "living condition", "socio-demographic status", "socio-economic status".

4.10 Data Collection and Data Management (Analysis):

All data collected either utilizing a literature matrix (annexed) or directly from website and/or using search engines and were checked for sources, accuracies and duplicate entries and were screed to remove.

Data were extracted following a uniform way by author, year, country, aim, research design, sample, participants, and relevant findings. Relevant findings were those that related to the inclusion criteria. To ensure accuracy, another investigator cross-checked the extracted data of all included studies using the full-text study.

5. Results and findings:

Of all the 44 literatures reviewed over the span of 22 years (2000 - 2022) the following findings were extrapolated from randomly picked 28 articles as shown in 'Literature Matrix' (attached at the end of this updated review. However, major highlights were focused on one of our published papers in ***Public Health*** (published byLondon Royal Society of Public Health, UK) back in 2007. [7]

It was thus emphasized more only due to its potentiality un terms of first ever published original article on Scabies from Bangladesh encompassing such a wider spectrum (prevalence, clinico-epidemiological findings, transmission of scabies mites through overcrowded bizarre living in residential Madrasahs).[7]

5.1 Region specific global burden of scabies in different countries[9]

The region-specific global distribution of scabies in various countries have been depicted from one of the recent the published manuscript in 2017 by Chante Karimkhani, et al, titled '**The global burden of scabies a cross-sectional analysis from the Global Burden of Dis Study 2015'** published in ***The Lancet Infect Dis,*[9]**

East Asia: China, North Korea, and Taiwan (province of China)

Oceania: American Samoa, Federated States of Micronesia, Fiji, Guam, Marshall Islands, North Mariana Islands, Papua N Guinea, Samoa, Solomon Islands, Tonga, Vanuatu

Southeast Asia: Cambodia, Indonesia, Laos, Malaysia, Maldives, Mauritius, Myanmar, Philip-
pines, Sri Lanka, Seychelles, Thailand, Timor-Leste, and Vietnam

South Asia: Bangladesh, Bhutan, India, Nepal, and Pakistan

Central Asia: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Mongolia, Tajikistan,
Turkmenistan, and Uzbekistan

Central Europe: Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Hungary,
Macedonia, Poland, Romania, Serbia, Slovakia, and Slovenia

Eastern Europe: Belarus, Estonia, Latvia, Lithuania, Moldova, Russia, and Ukraine

North Africa and Mid East: Afghanistan, Algeria, Bahrain, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya,

Morocco, Palestine, Oman, Qatar, Saudi Arabia, Sudan, Syria, Tunisia, Turkey, United Arab Emirates, and Yemen

Western sub-Saharan Africa: Benin, Burkina Faso, Cameroon, Cape Verde, Chad, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, São Tomé and Príncipe, Senegal, Sierra Leone, and Togo

Southern sub-Saharan Africa: Botswana, Lesotho, Namibia, South Africa, Swaziland, Zimbabwe

Eastern sub-Saharan Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mozambique, Rwanda, Somalia, South Sudan, Tanzania, Uganda and Zambia

Central sub-Saharan Africa: Angola, Central African Republic, Congo (Brazzaville), Democratic Republic of the Congo, Equatorial Guinea, and Gabon

Tropical Latin America: Brazil and Paraguay

Andean Latin America: Bolivia, Ecuador, and Peru

Central Latin America: Colombia, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, Panama, and Venezuela

Caribbean: Antigua and Barbuda, The Bahamas, Barbados, Belize, Bermuda, Cuba, Dominica Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Puerto Rico, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, and Virgin Islands

Western Europe: Andorra, Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and UK

Southern Latin America: Argentina, Chile, and Uruguay

North America: Canada, Greenland, and USA

Asia Pacific: Brunei, Japan, Singapore, and South Korea

Australasia: Australia and New Zealand

5.2 Findings on Global Clinico-epidemiology and Prevalence of Scabies Globally:

As mentioned earlier, we reviewed 44 literatures over the 22 years from 2000 through 2022, here, we tried to describe findings of following published manuscripts extrapolated from randomly picked 28 scientific articles published in several medical journals, worldwide (Vide: 'Literature Matrix')[12]

In a recent publication 'Estimating global burden of scabies: what else do we need?', Cox V., revealed a need for more widespread implementation and funding of much needed control programs to reduce global impact of scabies.[3] However, estimating prevalence, complication, and management of scabies in developing world- R.J. Hay concluded that the recurrent problems of scabies are that, in many parts of the world, there is a close association between human louse infestations and scabies, and control of both may be linked with ivermectin.[13]

In Bangladesh, Karim, et al described in their community based survey in 2011 to study the socio-demographic characteristics of children infested with community acquired scabies in densely populated residential Madrasahs in and around Dhaka, when they concluded immediate attention to be given among Madrasah children in developing sustainable long-term intervention programs to combat scabies hyperendemicity (silent epidemics) to save thousands of those children from impending serious complications.[7]

However, few years later K. Talukder[14] in his article 'Controlling scabies in Madrasahs (Islamic religious schools) in Bangladesh', revealed a prevalence of scabies came down from 61% to 10% after mass scabies treatment, due to significant improvements in personal hygiene practices at the interventional areas (Madrasahs surveyed).

Again, Moniruzzaman Khan[15] et al revealed that management of scabies infection among outdoor patients in BIRDEM General Hospital, Dhaka, being more common in over-crowded conditions and reported to affect any individual irrespective of social status, personal hygiene, profession, gender, age or ethnicity. But they reported that classical scabies in Bangladesh remains moderate.

Clinical profile and Quality of Life (QoL) in scabies patients- as reviewed by Abu Baker r (in Enam Medical College and Hospital, Savar, Dhaka) yielded that scabies moderately affected the QoL of patients feeling sort of embarrassment and so, socially got isolated due to stigma/shame associated with scabies.[16]

A original research by H Feldmeier's conducted a study in an impoverished community in rural Brazil in 2009. They reported that presence and severity of disease were associated with poor living conditions and illiteracy, and that scabies remained an important health problem characterized by continuous transmission and the parasitic infestation was embedded in a complex web of causation characterized by poor living conditions and a low level of education.[17]

Luis Shimose from USA (2013) reported in a that diagnosis, prevention and treatment of Scabies, by should be made to develop a standardized, reliable and cheap method for the diagnosis of scabies that can be affordable to underdeveloped countries, where most of cases of scabies are reported from.[18]

Another such review from Australia by Daniel Engelman[19] in 2019 reported that control of scabies revealed that scabies disproportionately affects disadvantaged populations and causes considerable morbidity leading to severe bacterial infection and immune-mediated disease. So, to develop a global control program, key operational research questions must be addressed. Earlier, in 2015, a study in Canada stated that: by considering underlying risk factors, viz., poverty, overcrowding and lack of access to clean water, improving access to health care, should reduce burden of scabies among indigenous communities.[20]

Original research by Feng-Zeng Li[21] in 2020, Diagnostic Accuracy of Ceroscopy for Scabies, suggests that Dermot Image System may significantly increase accuracy of diagnosing scabies owing to its sensitivity and specificity. DIS may also help monitoring clinical responses to anti-parasitic treatment and detecting the recurrence or reinfection of scabies.[21] Whereas, recently, in 2021, Russell T[22] revealed on how to manage pediatric scabies being a NTD having serious population health risks. However, D. Engelman[4] in his article, titled '2020 Intern Alliance for the Control of Scabies Consensus for the Diagnosis of Scabies', appealed for a global attempt to develop a pragmatic, yet robust set of diagnostic features should be made- the criteria which will provide greater consistency and standardization for scabies diagnosis in field and clinical settings.[4]

In a review article titled Treatment, prevention and public health management of impetigo, scabies, crusted scabies and fungal skin infections in endemic populations: a systematic review from Australia, 2019, Philippa J. May[23] suggests that the recommendations for skin infections in high-burden contexts also highlight the need for further rigorous, experimental studies to fill the evidence gaps. Pragmatic, practical, high-quality, well-funded RCTs are essential in the settings where the findings will have external validity if meaningful progress is to be made towards reducing the gap in skin health outcomes between the rich and poor.

The findings of an original study on outbreak of scabies among preschool children, Accra, Ghana, 2017, BB Kaburi[24] reported that scabies outbreak with a propagated source occurred in preschool children. It was controlled by mass treatment with benzyl benzoate and health education. Classrooms and sleeping mats were disinfected, the decongestion of classrooms and discouraged sharing of sleeping mats. We had similar observation in our study among the children of some residential institution in and around Dhaka, Bangladesh as well.[7]

Back in 2005, Dr Rod J Hay, [11] in a review in WHO (titled Epidemiology and management of common skin diseases in children in developing countries) suggests that considering prevention of the skin diseases in children, basic recommendations for improving hygiene would probably benefit certain disorders. However, this raises the question of feasibility and cost-effectiveness of associated measures which seem necessary to obtain a significant impact. This was what we also reported in 2007 in an original article published in Pub Health (from Royal Soc, of Pub Health, London).[7]

An original research of Bart J Currie[25] in 2001, Australia, titled Skin infections and infestations in Aboriginal communities in northern Australia suggests that the sustainable and long-term improvements in scabies, skin sores and GAS-related disease require fundamental changes that address social and economic inequities and, in particular, living conditions.

A 2001 research article of Francesco Lacarrubba[26] from Italy, A New Noninvasive Diagnostic Tool for Scabies in Children, showed that HM video dermatoscopy is rapid, effective, and sensitive, and its most important advantage in children is its high compliance rate, and that it does not cause pain or physical or psychological discomfort.

In USA Laura Edison[27] studied scabies and bacterial super infection in 2015, among American Samoan children and commented that bacterial super infection prevalence and frequent re-infestation high light importance of diagnosing scabies and early treatment of both patients and close contacts. Investigating why certain Am Samoan counties have a lower scabies incidence might help guide recommendations for improving scabies control among counties with a higher incidence.

In Germany, a study from 2012 conducted an investigation of scabies outbreak in a kindergarten with a particular pedagogical concept, since exposure patterns were rather similar in all children of

kindergarten, and was impossible to disentangle whether transmission predominantly occurred through intimate body contact, via fomites, or through both forms.[28] In a review from Australia, in 2004, titled, Scabies: New future for a neglected disease, Shelley F. Walton[29] found that the control of this disease is hindered by difficulties with diagnosis, treatment cost, evidence for emerging resistance and lack of effective vaccine. So a vast range of research is necessary for the early diagnosis of the disease, novel forms of chemotherapy, vaccine development and new treatment possibilities for this important but neglected parasite.

In an epidemiology and morbidity study on scabies and pediculosis capitis in resource-poor community in Brazil by Heukelbach[30] in 2005, revealed the 1st community-based study on the epidemiology and morbidity of scabies and head lice infestation which described that pediculosis capitis and scabies are hyper endemic in the study areas and are associated with considerable morbidity There is an urgent need to develop control measures for these parasitic skin diseases in resource-poor communities.

In a research article titled Transmission of scabies in rural community in Brazil, 2007, Anne Jackson's[31] study outcome shows that the rural communities in many developing countries where scabies is endemic, we suggest that in these settings sexual transmission of scabies plays only a negligible role and that control measures should focus on children and females.

In a review article titled High Burden of Impetigo and Scabies in a Tropical Country in Australia, 2009, Andrew C. Steer [32] revealed that the impetigo and scabies disease burden in children in Fiji has been underestimated and possibly other tropical developing countries in the Pacific. These diseases are more than benign nuisance diseases and consideration needs to be given to expanded public health initiatives to improve their control.

Again, in an original article titled Validation of an Integrated Management of childhood Illness algorithm for managing common skin conditions in Fiji, 2009, Andrew C Steer[33] showed that the IMCI skin algorithm is a robust tool that should be incorporated into the IMCI after some modifications relating to scabies and impetigo and the use of this algorithm will help reduce the burden of skin diseases in children in Fiji through improved case identification and management.

In an outbreak investigation study titled Scabies Outbreak in an Intensive Care Unit with 1,659 Exposed Individuals-Key for controlling the outbreak, Manuela Buehlmann[34] showed that the crusted scabies resulted in high attack rates among Jews and household contacts. Timely institution of hygienic precautions with close monitoring and widespread, simultaneous scarified treatment of all exposed individuals are essential.

In a review article titled Retrospective analysis of institutional scabies outbreaks from 1984 to 2013: lessons learned and moving forward, by K. E. Mounsey[35], it was found that the impact of institutional outbreaks, the burden in terms of attack rates, economic costs, treatment trends, the types of index cases and outbreak progression.

In review article titled Scabies in healthcare settings in France, 2010, Bouvresse, Sophie [36] it was shown that the inclusion of institutionalized patients in randomized controlled trials would be beneficial as present data concerning scarified effectiveness are obtained from trials that recruited individual participants and do not take into account a global strategy.

5.3 Scabies: Clinical manifestation:

US CDC and Prevention of Global Health Division of Parasitic Dis and Malaria reported on biology of scabies that, after starting successful treatment, scabies itchiness and rashes generally gets improved within a few days and normally it clears up completely within a month or sos.[38] However, post-treatment persistent rash may sometimes persist in few cases- which may be the out due to following reasons:[37]

- Misdiagnosis, incorrect treatment, resistance issues, re-infestation from untreated contacts that leads to persistent infestation (vital issue to prevent/ control)
- The hyper sensitivity reaction can be slow to settle, despite complete cure of parasitic infestation.
- On-going dermatitis occurs due to mite, scratching, irritation of topical treatment or other factors.
- Persistently itchy papules, nodules and eczematous plaques should be treated with frequent application of emollients and mild topical corticosteroids.
- Under-diagnosis/incorrect diagnosis is a major issue.

Figure-3, below, demonstrates various skin lessons of scabies (Engelman D).[4]

Fig. 3

Engelman D from Melbourne, Australian described the following findings of skin examination:[4]

[(a) Papules over the fingers, finger web spaces and back of hand of an adult.

(b) Papules and vesicles with excoriation on the volar wrist of a child.

(c) Papules, vesicles and pustules with excoriations over the palm and fingers of an infant.

(d) Widespread scabies rash in an infant. Larger nodules are seen on the torso, axilla and shoulder.

(e) Papules over the toes, feet and ankle of an infant.

(f) Ulcer, pustule/crust represents impetiginized (secondary bact. infection) of scabies lesions on child's legs

(g) Papules and nodules on the scrotum and penis. Lesions are also seen on the groin and inner thighs. (h) Crusted scabies with thick, yellowish scale of the right hand.

***Engelman D**. '2020 International alliance for the control of scabies consensus criteria for diagnosis'.*[4]

5.4 Scabies: Bangladeshi context:

Bangladesh with an area of ~148,460 kilo-meter[38], which is one of the world's most densely populate country (1286 people/km^2) with 150 million residents.[38] In countries similar to Bangladesh where scabies remains a major public health problem. The most common inter human ectoparasite infection that causes scabies is *Sarcoptes scabies* var hominis. Besides geographical topography, environmental pollution and water sanitation are also play vital roles behind this skin disease. It is presented as generalized intractable intense pruritus mainly at night creating discomfort and nuisance. Although scabies has low morbidity it may result in serious consequence such as glomerulo-nephritis, when it occurs together with bacterial infection.

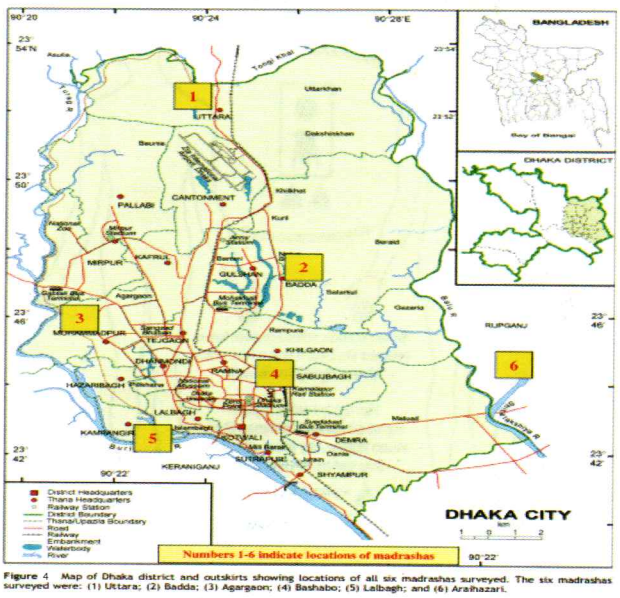

Figure 4 Map of Dhaka district and outskirts showing locations of all six madrashas surveyed. The six madrashas surveyed were: (1) Uttara; (2) Badda; (3) Agargaon; (4) Bashabo; (5) Lalbagh; and (6) Araihazari.

The first study of scabies, conducted in 2007 by Karim and Selim, et al., [1,7] described sociodemographic traits of children infested with scabies in densely populated communities of residential Madrasahs (Islamic Education Institute), findings showing that the mean age of the 492 children was 1.24±2.4 years. [7]

More than half (n=248, 50.4%) were aged 12–14.9 years, and 244 (49.6%) children were aged <12 years. Most of the children (n=455, 92.5%) were male and 13% had lost at least one parent (10% were orphans, 14% had no father and 15% had no mother).[7]

The report on institutional scabies in Bangladeshi Islamic Madrasahs found that many children were bedridden and had difficulty sleeping due to lack of education. The majorities of parents were illiterate or had an elementary education, and the majority worked as day laborers, rickshaw pullers, or home helpers.

Furthermore, 10.2% of the mothers had surplus income, 42.5% was financially stable, and 47.3% were insolvent.

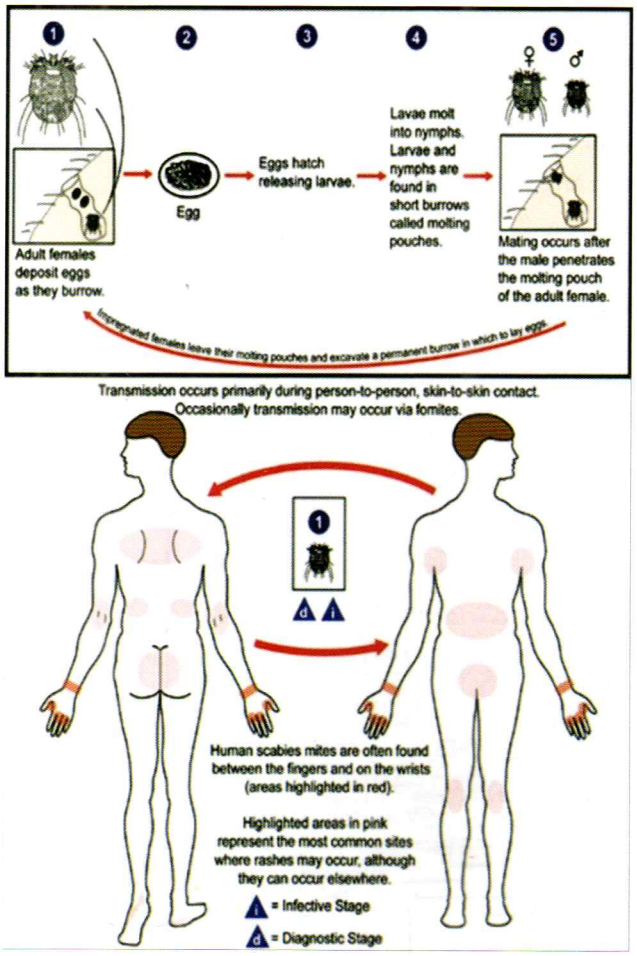

Figure-5: *Scabies transmission*[4]

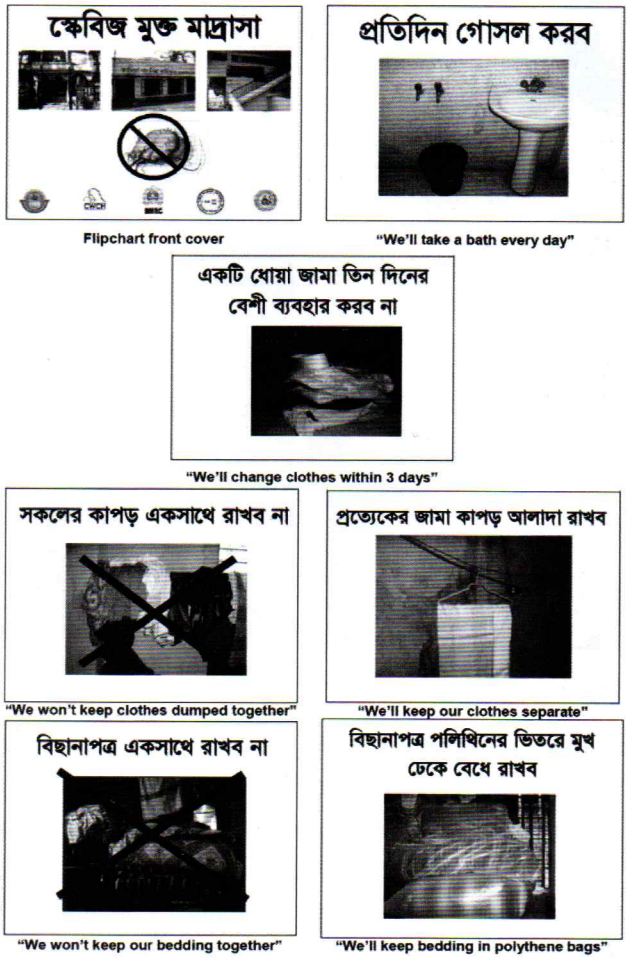

Figure-6: *Scenario of Madrasah for preventing scabies*[7]

Around 70% of children used tap water and 30% used tube or piped water for bathing and washing, 60% of them washed their clothes and bed sheets two to three times a fortnight, 36% did so in every 3-4 days, and ~90% slept on in floor on Patti (Thin Floor Mat) in close contact with each other.

The sleeping habits of those living so close together showed a substantial correlation with the severity of the illness and re-infection.[7]

Alike some of other reports on drug therapy[6, 15] findings of our study[7] on insufficient drug use resulted in re-imposedion, and over 85% of people were found to be successfully treated for scabies mites with benzyl Benzoate lotion, Monosulfirum cream, or Permsethrin cream. Oral ivermectin may occasionally be used in severe instances, as children are always at danger for scabs due to severe financial constraints and illiteracy.[7]

6. DISCUSSION:

Though Fuller LC in 2013 opined that globally, scabies has a low morbidity rate[39] but we found it in higher proportion among the children of institutional settings like Madrasah back in 2007.[7] However, Scabies may result in serious consequences like glomerulonephritis, when it occurs together with bacterial infection,[39] which we also found it similarly but less frequently among our children in residential Madrasahs of densely populated Dhaka city and its outskirts[7] which Fölster-

Holst R et al[40] also attested even 9 years (in 2016) after our publication[7] as the most common inter human ectoparasite infection caused by *Sarcoptes scabiei* var hominis.[40]

On human epidermis, Scabies mites are often colonized and transmitted from person to person via skin-to-skin contact[41] particularly in overcrowded setting. It generally presents as intractable intense pruritus flaring up mainly during night creating huge discomfort and big nuisance[41,42] as we have also observed in a survey among the children living in some residential institutional.[7]

Most important risk factors of this contagious disease and its frequent transmission that includes: overcrowded living in households/room together with other families, poverty and lower parental educational attainment, sharing of personal belongings (bed sheets, bed linen, floor mat, poor bathing, poor personal hygiene, low socio-economic status, and so on.[7, 43]

Scabies reportedly remains more among younger children and among those who hardly maintain proper hygienic practices particularly in overcrowded households or various institutional settings like kindergarten, nurseries, day care, .[31] and, Madrasahs where we conducted an institutional survey in an around Dhaka back in 2007.[7]

Scabies infection is not completely dependable on educational status but need consciousness that stop hygienic practice and avoid over crowded place.[31] Health education should be included in educational curriculum and patients especially mothers and teachers should be educated in the light of health education, that the peoples can be introduced to the self-care system for themselves from the childhood.

Health education through the mass media should be provided in simple, easily understandable way regarding the cause and preventive measures of scabies infection.[44] School health should be introduced for practical application of hygienic practice. In this study it can be seen that, the lack of treatment protocol, miss diagnosis, inadequate treatment, financial insufficiency are also the vital reasons behind the re-infection of this disease.

It can be mentioned that patients of scabies follow doctor advice perfectly when they are treated. Such as they must avoid body contact until they and their partners and close contact have been treated. Partner and close contact should be treated simultaneously. These are the essential precautions in scabies reinfection.

Clinicians and drug companies recommended treatment of family members and close contacts at the same time as cases, to improve cure rates and reduce reinfection.[45] It is concluded that scabies infection is more prevalent in winter than summer. Prevention is dependent on principles common to most infectious diseases, that is, limitation of contact with the mite.

In Bangladesh there are numerous medical treatments available for scabies. But most effective Benzyl Benzoate lotion, Monosulfirum cream or Permethrin cream was found to be effective for the eradication of scabies mites approximately 85% of children, alike our findings.[7] Sometimes in severe cases oral ivermectin can be given to reduce the disease severity.[15]

7.1 Highlights:

- Scabies, an ancient disease of poor communities flaring up as a global burden.[3, 9, 10]
- Most research on scabies is conducted in urban, when rural people suffer more.[4, 13]
- Most focus on prevalence/clinical issues,[4] so, epidemiological and socio-economic data lacks
- Estimating global burden of scabies, Cox V, Fuller LC, et al commented that more widespread implementation and funding for much needed control programs are essential towards reducing global impact of scabies.[3]
- Estimating the prevalence, complications, and management of scabies in developing world- R.J. Hay[13] concluded that the recurrent problems of scabies are a close association between scabies and human louse infestations though the control of both are linked with ivermectin.

- Generation of scabies data remain important to derived from crowded communities, displaced refugees, crowded residential institutions in order to address scabies outbreaks which may occur anytime if unidentified/untreated scabies are not addressed, properly.[10]

7.2 Bottom-line:

- High proportion of <12 years-old children are infested with scabies in Bangladesh
- This contagious skin disease is more common among overcrowded population in particular.
- Scabies is associated with intense generalized pruritus/rash, itching/scratching more in winter.
- Household poverty, poor personal and environmental hygiene, unhygienic water sanitation, low socio-economic status, overcrowded population, sharing habit of personal belongings such as- apparels, bed linen, towel and so on are the main causes of disease transmission.
- Treating with Benzyl Benzoate lotion, Monosulfirum cream, Permethrin cream and oral ivermectin for severe cases have reportedly been effective.
- However, proper prevention and control depends on the eradication of scabies mites in 90% of children.
- Poorer community's children remain at constant yet greater risk of contracting scabies due to gross financial constraints and ignorance on scabies transmission and proper public health education- remains a burning issue to be endure at no time lost!

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Annexure-1: Literature Matrix *(based on randomly selected 28 studies, only)*

Matrix of childhood scabies				
Sl. No	Country, Year, Author	Title of Article	Article Type	Major Findings
1.	Global, 2020, V.Cox[3]	Estimating the global burden of scabies: what else do we need?	Review article	The case for more widespread implementation and funding of much needed control programs to reduce the global impact of scabies.
2.	Bangladesh, 2013, K. Talukder[14]	Controlling scabies in madrasahs (Islamic religious schools) in Bangladesh	Original research article	Before the intervention, the prevalence of scabies was 61% and 62% but after mass scabies treatment, the prevalence reducing to 5% and 50% in intervention and control madrasahs, There were significant improvements in personal hygiene practices at the intervention madrasahs.
3.	Bangladesh, 2020, M. Moniruzzaman Khan[15]	The management of Scabies infection among the outdoor Patients of BIRDEM General hospital, Dhaka, Bangladesh"	Original research article	Scabies is more common where overcrowded conditions prevail; it can affect any individual irrespective of social status, personal hygiene, profession, gender, age or ethnic origin and Classical scabies is more active in Bangladesh as a moderate form.
4.	UK, 2012, R.J. Hay[13]	Scabies in the developing world-its prevalence, complications, and management.	Review article	The recurrent problems of this disease are that, in many parts of the world, there is a close association between human louse infestations and scabies, and control of both may be linked with ivermectin.
5.	Bangladesh, 2007, K S Anwar[7]	Socio-demographic characteristics of children infested with community acquired scabies in densely populated residential institutions in Dhaka, Bangladesh.	Pediatric research	These findings demands immediate attention to developing sustainable long-term intervention programs to combat scabies hyperendemicity (silent epidemics) to save thousands of children from impending serious complications.
6.	Bangladesh, 2022, Md. Abu Baker[16]	Clinical Profile and Quality Of Life in Scabies Patients-A Study In Enam Medical College And Hospital, Savar, Dhaka, Bangladesh.	Reviewed Journal	Scabies moderately affected the quality of life of the patients in the present study in the form of feeling of embarrassment and social isolation due to stigmata and shame associated with this disease. All these findings were more frequently observed among adult patients as compared to children.
7.	Brazil, 2009, Hermann Feldmeier[17]	In an impoverished community in rural Brazil: Presence and severity of disease are associated with poor living conditions and illiteracy	Original research article	Findings show that the impoverished community scabies is an important health problem characterized by continuous transmission throughout the year. The parasitic skin disease is embedded in a complex web of causation characterized by poor living conditions and a low level of education.
8.	USA, 2013, Luis Shimose[18]	Diagnosis, Prevention, and Treatment of Scabies.	Review article	Efforts should be made to develop a standardized, reliable, and cheap method for the diagnosis of scabies that can be affordable to underdeveloped countries, where most of cases of scabies are seen.
9.	Australia, 2019, Daniel Engelman[19]	The public health control of scabies: priorities for research and action.	Review article	Scabies disproportionately affects disadvantaged populations and causes considerable morbidity and leads to severe bacterial infection and immune-mediated disease. So, to develop a global control program, key operational research questions must be addressed.
10.	Canada, 2015, Anna Banerji[20]	Scabies	Journal article	Considering the underlying risk factors, such as poverty, overcrowding and lack of access to clean water, while improving access to health care, should help to reduce the burden of this disease in Indigenous communities.
11.	Korean, 2020, Feng-Zeng Li[21]	Diagnostic Accuracy of Ceroscopy for Scabies	Original research	The study suggests that DS (Dermat Image System) may significantly increase the accuracy of diagnosing scabies owing to its sensitivity and specificity. DS may also help in monitoring the clinical responses to anti-parasitic treatment and detecting the recurrence or reinfection of scabies.

12.	Australia,2021,Russell Thompson[22]	Pediatrics: how to manage scabies		Scabies as a neglected tropical disease with serious population health risks, often in areas of great health need, improved community control strategy, research into emerging and repurposed topical and systemic treatments and evidence-based rigorous
13.	Australia, 2020, D.Engelman[4]	The 2020 Intern Alliance for the Control of Scabies Consensus for the Diagnosis of Scabies	Journal article	A global attempt to develop a pragmatic, yet robust set of diagnostic features. It is hoped these criteria will provide greater consistency and standardization for scabies diagnosis in field and clinical settings.
14.	Australia, 2019, Philippa J. May[23]	Treatment, prevention and public health management of impetigo, scabies, crusted scabies and fungal skin infections in endemic populations: a systematic review	Review article	The recommendations for skin infections in high-burden contexts also highlight the need for further rigorous, experimental studies to fill the evidence gaps. Pragmatic, practical, high-quality, well-funded RCTs are essential in the settings where the findings will have external validity if meaningful progress is to be made towards reducing the gap in skin health outcomes between the rich and poor.
15.	Ghana, 2019, Basil Benduri Kaburi[24]	Outbreak of scabies among preschool children, Accra, Ghana, 2017	Original research	The findings show that, scabies outbreak with a propagated source occurred among preschool children. It was controlled by mass treatment with benzyl benzoate and health education. Classrooms and sleeping mats were disinfected, the decongestion of classrooms and discouraged sharing of sleeping mats.
16.	WHO,2005 Dr Rod J Hay[25]	Epidemiology and management of common skin diseases in children in developing countries	Review article	Considering prevention of the skin diseases in children, basic recommendations for improving hygiene would probably benefit certain disorders. However, this raises the question of the feasibility and cost-effectiveness of associated measures which seem necessary to obtain a significant impact.
17.	Australia, 2001, Bart J Currie[26]	Skin infections and infestations in Aboriginal communities in northern Australia	Original research	Sustainable and long-term improvements in scabies, skin sores and GAS-related disease require fundamental changes that address social and economic inequities and, in particular, living conditions.
18.	Italy,2001, Francesco Lacarrubba[27]	A New Noninvasive Diagnostic Tool for Scabies in Children	Research article	HM video dermatoscopy is rapid, effective, and sensitive, most important advantage in children is its high compliance rate, does not cause pain or physical or psychological discomfort.
19.	USA,2015, Laura Edison[28]	Scabies and Bacterial Super infection among American Samoan Children	Review article	Bacterial super infection prevalence and frequent re-infestations highlight the importance of diagnosing scabies and early treatment of patients and close contacts. Investigating why certain AS counties have a lower scabies incidence might help guide recommendations for improving scabies control among counties with a higher incidence.
20.	Germany,2012, Ari Wales[29]	Investigation of a scabies outbreak in a kindergarten in Constance, Germany	Research article	Outbreak of scabies in a kindergarten with a particular pedagogical concept. Since exposure patterns were rather similar in all children of the kindergarten, it was impossible to disentangle whether transmission predominantly occurred through intimate body contact, via fomites, or in both forms.
21.	Australia, 2004, Shelley F. Walton[30]	Scabies: New future for a neglected disease	Review article	The control of this disease is hindered by difficulties with diagnosis, treatment cost, evidence for emerging resistance and lack of effective vaccine. So vast range of research is necessary for the early diagnosis of the disease, novel forms of chemotherapy, vaccine development and new treatment possibilities for this important but neglected parasite.

22.	Brazil, 2005, J. Heukelbach[31]	Epidemiology and morbidity of scabies and pediculosis capitis in resource-poor communities in Brazil	Original Research	The first community-based study describing in detail the epidemiology and morbidity of scabies and head lice infestation in Brazil which descried that pediculosis capitis and scabies are hyper endemic in the study areas and are associated with considerable morbidity The urgent need is to develop control measure for the parasitic skin disease in resource-poor communities.
23.	Brazil, 2007, Anne Jackson[32]	Transmission of scabies in a rural community	Research article	Study outcome shows that rural communities in many developing countries where scabies is endemic, we suggest that in these settings sexual transmission of scabies plays only a negligible role and that control measures should focus on children and the female se
24.	Australia, 2009, Andrew C. Steer[33]	High Burden of Impetigo and Scabies in a Tropical Country	Review article	The impetigo and scabies disease burden in children in Fiji has been underestimated and possibly other tropical developing countries in the Pacific. These diseases are more than benign nuisance diseases and consideration needs to be given to expanded public health initiatives to improve their control.
25.	Fiji, 2009, Andrew C Steer[34]	Validation of an Integrated Management of Childhood Illness algorithm for managing common skin conditions in Fiji	Original article	The IMCI skin algorithm is a robust tool that should be incorporated into the IMCI after some modifications relating to scabies and impetigo and the use of this algorithm will help reduce the burden of skin diseases in children in Fiji through improved case identification and management.
26.	Switzerland, 2015, Manuela Buehlmann[35]	Scabies Outbreak in an ICU with 1,659 Exposed Individuals-Key for controlling the outbreak.	Outbreak investigation study	Crusted scabies resulted in high attack rates among hews and household contacts. Timely institution of hygienic precautions with close monitoring and widespread, simultaneous scarified treatment of all exposed individuals are essential.
27.	Australia, 2016, K. E. Mounsey[36]	Retrospective analysis of institutional scabies outbreaks from 1984 to 2013: lessons learned and moving forward.	Review Article	The impact of institutional outbreaks, the burden in terms of attack rates, economic costs, treatment trends, the types of index cases and outbreak progression.
28.	France, 2010, Bouvresse, Sophie[37]	Scabies in healthcare settings	Review Article	Inclusion of institutionalized patients in randomized controlled trials would be beneficial as present data concerning scarified effectiveness are obtained from trials that recruited individual participants and do not take into account a global Strategy.

Letter to the Editor

Common Ocular Diseases: Recent Observation from a Community Based Ophthalmological Clinic in Shaymoli, Dhaka

Md. Abdullah Al Kafi

Dear Editor

I am an ophthalmologist and eye-surgeon running an ophthalmological clinic. I aim to share some of my major observations during my day-to-day ophthalmological practice which I had to deal with, seriously, over the past period of few years (January'2017 - December 2021).

In this five years of my ophthalmological practice I have managed clinically and surgically about 30,000 patients attending our eye hospital/clinic. I have successfully managed about 5000 various types of ocular disease pertaining to minor eye problems to major surgeries as shown below:

List of eye problems among patients having been suffered from several ophthalmic disorders:

- Diabetic retinopathy,
- Dry eye diseases,
- Age related cataract,
- Age related macular degeneration,
- Viral keratitis
- Viral conjunctivitis patients are increasing day by day.
- Others like eye injuries (traumatic, foreign bodies' chemical burns etc.)

Although, most of these patients attended with the defect of eye powers (Refractive errors), following my own, yet, effective eye management protocol for every patient suffering from refractive error, followed by IOP (Intraocular pressure) and dry eyes test, (schirmer test) were performed in most cases. Below remain a list of my observations as an ophthalmological expert:

- Patients attending with the complaints of dry eye are getting rampant day by day.
- Previously ophthalmological diseases/disorders were observed among only adult's but, my current observation remain that eye sight abnormalities (refractive error, etc.) are becoming much more big issue among young group of people like school going children several young adults and often old aged groups of people, mostly living in and around our locality of Shaymoli, Adabor, Ring road, Mohammadpur, etc.
- To my opinion all these ophthalmological issues occur much more due to air pollution intake of food chemical toxic and drinking polluted water.
- Moreover, visual online activities (on smart phones etc.) gradually making most of us if not all, device dependent, which may well remain another major cause of eye- problems like: dry eyes or refractive error.
- Conjunctivitis mostly being of viral origin, which i have been observing occurred more frequently than we faced those earlier currently being flaring up much more that even persists for 3-6 weeks or longer.
- These issues currently remain as more important and burning issues that sometimes do not even respond to conventional treatment. This may

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Received Date : 10 March, 2022
Accepted Date : 15 April, 2022

become so serious in near future unless we fail to make people aware to take care of our eyes, with proper treatment/management.

- It is, therefore the high time, according to my serious observations based on community based ophthalmological practice to be more serious thus being aware on these issue more attentive, in depth. To me, any ophthalmologic consultation requires such measures through following proper advices given, to abide by mandatorily.
- Simple conjunctivitis causing viral keratitis occurs due to negligence of not treating those eye-issues early, and, properly.
- One, of my other important observation is:

Many patients gave a history of using chloramphenicol eye drop only due to quickly and easily available medicine bought from nearer by medicine shop. And so, their eyes are not gets cured, even within the next 7 to 10 days of applying those. So, at last when the patients attends to my clinic with there already developed viral keratitis or keratoconjunctivitis, only due to either negligence or not addressing the issue checking up earlier by any eye specialist/ ophthalmologist.

- Since such eye-diseases need prolonged treatment minimum upto 6 to 8 weeks, but if it is not treated properly and at first time, such patients may face the worst consequences of long term suffering which could have easily be cured, otherwise. So, one must be aware on handling such ophthalmological issues of simple conjunctivitis in time and properly being one of the experts enough trained ophthalmologists.
- One of my other vital observations is on post-operative (eye-surgery) complications: This happens much more in many cases of post-cataract surgery patients who suffer more, only due to long gap between doctors and patient's communications for periodic follow up and maintaining doctor's advice at par.
- Any complication during cataract surgery may happen/occur, any time, so it must be clearly discussed/ addressed or managed. So, the patients and/or their guardians should create a good rapport and frequent visits with their eye specialists better to go to show it to the doctor who examined saw the patient earlier and should clearly be noted down, either, on the discharge certificate, or, on the prescription(s) with appropriately referral letter to higher level ophthalmological hospitals, where managements of such complex ophthalmological cases are available.

Last but not the least: To me, any type of surgery complication should not be masked/ hidden by the patients/ guardians. In fact we should be aware about this and must comply with the ophthalmologist's advice and suggestions, properly.

Bottom line:

The main objective of this communication to keep our community aware on the aforementioned tips and suggestions on ophthalmological details/eye-injuries. One must be very alert on these issues so that everyone in our community both the ophthalmologists and the patients/guardians parties. This would assist to opt for better care of eyes-a sophisticated yet so delicate an organ better, faster and effectively.

With these aforementioned news and views, we the 'Shaymoli Eye Hospital' look forward to conduct community uplift men working hand-in-hand towards better community development activities and conductive prudently essential research.

Recently, we plan to conduct a community based research on common eye disease in our communities around Shaymoli/ ring road, Mohammadpur, Adabor, etc. soon, employing some of our volunteers (junior ophthalmologists) and led by public health physicians and researchers.

United we stand!!! Come let's keep our vision intact!!!!

Conclusion:

We, the ophthalmologists, particularly those who are running/practicing any community based eye clinic/ hospitals should provide due attention and adequate time for checking the patients, on any ophthalmological diseases/ disorders, or, seeking advice regarding different treatment modalities but must discuss on probable complications of eye case issues. Plausible complications of drugs/treatment modalities, and, must abide by the post-operative follow-up details to keep the fate of their eyes better, otherwise might face worse consequence, if left untreated.

News and Views

Success of Medical Research Unit (MRU)

PROJECT TITLE-1:

The Molecular genetic approach to diagnose primary immune-deficiencies (PIDs) in children attending major hospitals in Dhaka city.

Principal Investigator and Co-investigators(s):

1. PI-Dr. Sudipta Roy, Assistant Professor, Dept. of Pediatrics, Ad-din Women,s Medical College Hospital, 2 Bara Maghbazar, Dhaka 1217.
2. Prof. Mahmuda Hassan (AWMCH), Co-Principal Investigator (Co-PI)
3. Prof. Marium Begum (BAMCH), Co-Investigator (CI)
4. Dr. Farhana Rahman, Associate professor, Ad-din Barrister Rafiq-Ul-Haq Hospital (ABRH), Co- Investigator (CI)
5. Prof. Md. Mahbubul Hoque (DSH), Co-Investigator (CI)
6. Dr. Tania Islam, Assistant professor, ICMH, Co- Investigator
7. Dr. Rahat Bin Habib, Assistant Professor (SSNIMC), Co-Investigator (CI)
8. Dr. Zannatul Ferdous Sonia, Assistant Professor (AWMCH), Co-Investigator (CI)

Area of research: Genetic study and experimental and Translational Medicine (Item #8 of the advertisement in research proposal of MOHFW, No.59.00.0000. 140.19. 215.21.269, dated 9 May 2021). Our interest is Pediatric Genetic Disorder.

Study place/institute:

a. Ad-din Women,s Medical College Hospital (AWMCH), 2, Bara Moghbazar, Dhaka
b. Basundhara Ad-din Medical College Hospital (BAMCH), South Keraniganj, Dhaka.
c. Ad-din Barrister Rafiq-Ul-Huq Hospital (ABRH), Postogola,Jurain, Dhaka
d. Dhaka Shishu Hospital (DSH), Shyamoli, Dhaka
e. Institute of Child and Mother Health (ICMH), Matuail, Dhaka

Aim: To confirm the diagnosis of clinically suspected screening positive PIDs in Bangladeshi children utilizing molecular genetics.

Duration of study: 2 years (includes 1st two months to organize the project and the last two months for data entry/analysis, final report writing, and publication).

Total Cost: 65,00,000 (Sixty-Five lac only)

PROJECT TITLE-2:

Comparison of efficacy of Heated Humidified High Flow nasal cannula (HHHFNC) with Nasal Continuous Positive Airway Pressure (nCPAP): a primary respiratory support in neonates

Principal Investigator and Co-investigators(s):

1. Dr. Sabina Yasmin, Assistant Professor (Neonatology), Ad-din Women's Medical College Hospital, Dhaka.
2. Prof. Md. Abdul Mannan, Professor & Head, Department of Neonatology.
3. Dr. Mohammod Jobayer Chisti: Sr. Scientist, Nutrition and Clinical Services Division Clinical Lead, Intensive Care Unit (ICU) & Consultant Physician, Acute Respiratory Unit (ARI) Ward & Head, Clinical Research, Hospitals, Icddr,b, Dhaka.
4. Dr. Navila Ferdous, Assistant Professor of Neonatology, AWMCH
5. Dr. Parves Anwer, Assistant Registrar, Dept. of Neonatology, AWMCH
6. Dr. Khandakar Razwan Hossain, Resident Medical Officer, Dept. of Neonatology, AWMCH
7. Dr. Sadia Hossain, Resident Medical Officer, Dept. of Neonatology, AWMCH
8. Shanta Islam (Sr. Staff Nurse), Eva Rani (junior Staff Nurse), AWMCH
9. Mst. Tahmina Khatun (Respiratory Therapist), AWMCH
10. Most. Shahana Khatun (Respiratory Therapist), AWMCH

Area of research: Modernizing current health delivery system including updating health administration- Topic no. 11 on the advertisement in research proposal from MOHFWNo.59.00.0000.140.19.215.21.269, dated 09.05. 2021. Our interest is on: Comparison of 6 efficacy of Heated Humidified-High-flow nasal cannula (HHHFNC) with nasal Continuous Positive Airway Pressure (nCPAP): a primary respiratory support in neonates.

Study place/institute: Ad-din Women,s Medical College Hospital (AWMCH), 2, Bara Moghbazar, Dhaka

Aim: To determine whether HHHFNC is non-inferior to NCPAP in avoiding treatment failure when used as early non-invasive respiratory support (NIRS) for newborns.

Duration of study: One and half years (includes 1st month to organize the project and the last 2 months for data entry/ analysis, final report writing and publications

Cost: 40,00,000 (Forty lac only).

Dr. Sudipta Roy and Dr. Sabina Yasmin: The two Assoc. Profs who achieved PM-initiated MOHFW's 2021-22 IHSRD Research Award through our medical research unit.

News and Views

Research Methodology Course for BSc 4th Year Nurses of Ad-din Women's Medical College through Medical Research Unit (MRU)

We are pleased to announce that, through the Medical Research Unit, we have taught our BSc 4th Year Nurses at Ad-din Women's Medical College in research methodology and biostatistics, which will lead to a dissertation. The three groups (Groups A, B, and C) that had successfully finished their course from 20 October 2021 to 30 August 2022.

The following topics were covered in the research methods course:

1. Research methodology: Definition/Study kinds (Qualitative & Quantitative), Literature search, Project preparation: Protocol writing, sample technique/ Size, Scientific report writing, Study design, Questionnaire preparation (open, closed, hybrid), and administrative work among research population.
2. Data management, field/hospital-based data collecting, data input (Microsoft Excel/SPSS), and data analysis: SPSS, Win 23.0

Ultimately, all groups successfully defended their dissertations and received high scores.

The abstract of three groups are following-

GROUP-A: KNOWLEDGE BASED BEHAVIORAL AWARENESS ON CHILDHOOD MALNUTRITION AMONG THE MOTHER'S ATTENDING AD-DIN WOMEN'S MEDICAL COLLEGE HOSPITAL

Abstract

Background: Malnutrition, as defined by the WHO as deficiencies, excesses or imbalances in energy and/or nutrients that a person intake leading to under nutrition and/or, overweight remain a huge public health challenge, globally. Though consequence of malnutrition remains life-threatening it remains reversible on early diagnosis and treatment. Guessing the in-depth problem of childhood malnutrition in Bangladesh, we assessed the knowledge-based behavioral awareness on childhood malnutrition among mothers that remain essential for better child survival, health, and, cognition.

Objectives: To assess the knowledge-based behavioral awareness on childhood malnutrition among of mothers attending Ad-din Medical College Hospital.

Methodology: Hospital-based cross-sectional survey performed during Dec 2021 through May 2022. A total of 150 mothers aged >18-35 years attending the pediatric departments at the AWMCH, Dhaka.

Result: Of total 150 mothers (mean age 25±3.3 years), 70 (47%) could define malnutrition correctly as 'deficient in nutrition level due to less food intake', followed by 19 (13%) child gets cranky, cries out often, irritable mood, denies to eat' and 15 (10%) child becomes more passive and avoid to walk. However, 46 mothers (31%) had less/no knowledge on malnutrition. On enquiring types of malnutrition if they know, 26% mothers said the child gets lean and thin with budged tummy (Marasmus), 8% Looks lethargic but swollen (Kwashiorkor), and 3% opted for both types but very weak (Marasmus-kwashiorkor). On-an-average, ~31.5% could answer more specifically that their children got very weak, thin, and lethargic (under-nutrition).

Moreover 96% revealed to introduce colostrum to child right after birth and 47% mother revealed good knowledge on the impact of childhood vaccination that it may impact on reducing malnutrition, while 28% mother opined neutral but 15% mothers did not know about malnutrition.

Interestingly, ~90% mothers had a good knowledge on EBF (exclusive breast feeding) while 11 had no idea. While 48% knew about balanced diet (rich in protein, carbohydrate and fat) but 41% knew it partially. However only 11% mothers feed balanced diet to their children but not in most.

Conclusion: Findings of this cross-sectional survey yielded that majority of mothers, interviewed, knew about childhood malnutrition quite well but >half of them remain unaware of hygienic practices and plausible risk factors of malnutrition. Since this study was conducted only in AWMCH, our findings should be interpreted cautiously unless other better designed long-term studies prove it to agree or refute. Our data, however, cannot claim to represent country's total scenario.

GROUP B: PERCEIVED KNOWLEDGE ON BREAST CANCER AMONG ADULT FEMALE PATIENTS ATTENDING AD-DIN WOMEN'S MEDICAL COLLEGE HOSPITAL

Abstract

Background: Structure of breast consists of complex network of various tissues and tiny, tube-like structures rich in blood and lymph nodes as a bean-shaped organ that help fight against infection. And, cancer, a condition where healthy breast cells change and grow forming uncontrollable mass or sheets called tumor particularly of malignant type, that grows locally but spread out to other parts of body via metastasis. Since breast cancer (Br-Ca) is the most commonly frequent malignancy being the highest fatality rates among women, worldwide. Moreover, the incidence, morbidity, and mortality rate of Br-CA is globally rampant being reported as the leading cause of global cancer in 2020. Global estimate of Br-CA remains 2.3 million 11.7% being new cases that the WHO report a fatality of 685,000 females in 2020. Since it is so important for the females to know about Br-CA, its clinico-epidemiology and early diagnosis to prevent related morbidity and mortality, we therefore, conducted this study, as one of the prime importance for women, worldwide.

Objectives: To evaluate the knowledge, awareness and perceived barriers among females attending this tertiary care hospital (AWMCH) regarding the breast cancer in good details.

Methods: Cross-sectional hospital-based survey conducted during December 2021 to May 2022. The total study subjects were 250, 18-55 years-old adult females attending various wards of AWMCH.

Results: While most women (64%) lack knowledge on breast cancer, 36% had no idea. Also revealed that knowledge about breast cancer cause lacking of breast feeding known by (63.6%) respondents, (36.4%) respondents had no idea. In this study, (76.8%) respondents had idea about prevention of breast cancer (23.2%) respondents had no idea about the prevention. Age of the patients is significantly associated with educational level. Here, P-value P<0.001.

Conclusion: Educational interventions and proper, appropriate and socially acceptable awareness programs will help to gain knowledge and awareness by addressing barriers regarding breast cancer among the females in Bangladesh.

GROUP C: PERCEIVED KNOWLEDGE AND BEHAVIOR ON WEANING FOOD OF MOTHERS ATTENDING AT THE DEPARTMENT OF PEDIATRICS, AWMCH, DHAKA

Abstract

Background: Breast milk remains sufficient to meet child's nutritional requirement up to 6 months. After that the young children require complementary feeding to ensure adequate nutrition supply (both macro-and-micro nutrients) that ultimately leads to a healthy young/adolescent. Since, weaning period plays a vital role in the growth and development of child's life, it is imperative that every mother should know on appropriate weaning practice as an essential issue to grow their children healthy, nutritious and happy. Not only that proper weaning assists to develop child's better nutrition and in developing child's cognition, too. We, therefore, conducted this study to assess mothers' knowledge on proper weaning.

Objective: To assess the knowledge and behavior of mothers regarding weaning food and children's health and hygiene.

Methods: This cross-sectionally designed observational study was conducted at the Department of Pediatrics,

Ad-din Women's Medical College and Hospital (AWMCH), Maghbazar, Dhaka. Data were collected using face to face interview utilizing a pre-tested structured questionnaire. The study populations were mothers having at least 1 child who attended the pediatric ward of AWMCH. Data was collected by us- the 4th year BSc nursing students in pediatric wards (assisted by a pediatrician and a nutritionist).

Result: Our findings showed 85% respondents used to breast feed their children exclusively to while 15% did not. Among mothers, who gave their children complementary food (CF): 25% gave it twice/daily, 31% thrice/daily, 37% four-times a day and 7% gave it 5 times/day. Finally, our findings yielded a positive correlation between mothers' education with their knowledge ($p<0.02$), significantly, in feeding their children packaged baby-food.

Conclusion: Our findings revealed that most mothers have a good knowledge in practicing appropriate weaning food. Most of the mothers know the suitable age to start giving complementary food as well as the right composition of weaning food. However, family size and monthly income did not impact on appropriate weaning practice.

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