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ORIGINAL ARTICLE

Comparison of neonatal outcome in laboring patients with fetal distress on cardiotocography having clear liquor versus meconium-stained liquor.

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ABSTRACT… Objective: To compare neonatal outcomes in laboring patients with fetal distress on CTG who had either clear or meconium-stained amniotic fluid. **Study Design:** Comparative Cross-sectional study. **Setting:** Department of Gynecology, MNCH Hospital Faisalabad. **Period:** July 2024 to December 2024. **Methods:** Included 158 laboring patients diagnosed with fetal distress on CTG, divided into two groups: Group A (clear liquor, n=79) and Group B (meconium-stained liquor, n=79). Fetal distress was defined by CTG abnormalities, and neonatal outcomes were assessed based on the Apgar score (<7 at 5 minutes) and NICU admission within 12 hours of birth. Stratified analyses were performed to evaluate the impact of demographic and clinical variables. **Results:** The groups were comparable in terms of age, gestational age, parity, duration of labor, and mode of delivery. Poor Apgar scores were observed in 59.5% of Group A and 57.0% of Group B (p = 0.747). NICU admissions were slightly higher in Group B (69.6%) compared to Group A (65.8%), but the difference was not statistically significant (p = 0.610). Stratified analyses showed no significant differences in neonatal outcomes based on demographic or clinical factors. **Conclusion:** This study found no significant differences in neonatal outcomes between patients with fetal distress on CTG and clear or meconium-stained liquor. The findings emphasize the importance of individualized labor management and suggest that MSAF, while a potential risk factor, does not independently dictate adverse outcomes when CTG abnormalities are present.

Key words: Apgar Score, Cardiotocography, Fetal Distress, Meconium-stained Amniotic Fluid, Neonatal Outcomes, NICU Admission.

INTRODUCTION

Fetal distress denotes a state of abnormal fetal physiology in which disrupted oxygenation, ranging from mild hypoxia to prolonged asphyxia, increases the probability of fatal or irreversible outcomes.[1-2] Fetal growth and development depend significantly on the presence and function of amniotic fluid.[3] By maintaining a low-resistance and protective environment, amniotic fluid plays a pivotal role in fetal development.[4] Approximately 12–16% of all deliveries show evidence of meconium-stained amniotic fluid.[5]

The presence of meconium-stained amniotic fluid increases the risk of respiratory distress in newborns by approximately 100 times compared to clear fluid deliveries. Even among low-risk patients, meconium-stained amniotic fluid is a frequent occurrence, associated with a five-fold rise in perinatal mortality compared to clear fluid deliveries.[6] Obstetric observations over the years have highlighted meconium passage as a concerning indicator of potential fetal asphyxia. Thought, it has historically been regarded as a conventional indicator of fetal distress, but CTG has become the preferred contemporary approach for monitoring fetal well-being during pregnancy and labour.[7]

Fetal heart rate monitoring through CTG is generally acknowledged as a dependable technique for assessing fetal well-being during labour. CTG generates a continuous electronic trace of the fetal heart rate, obtained through an

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ultrasound transducer attached to the mother's abdomen. It has become the most frequently employed tool for fetal monitoring in both antepartum and intrapartum settings across developed countries. The presence of both abnormal CTG results and meconium-stained fluid is associated with a significantly increased risk of poor perinatal outcomes.[8] According to a study[9], poor APGAR scores were observed in 13.7% of neonates with clear liquor versus 36.8% with meconium-stained liquor, with NICU admission rates of 6.2% and 21.5%, respectively, in neonates exhibiting fetal distress on CTG.

This study aims to evaluate how the integration of CTG with the presence of meconium-stained amniotic fluid can improve intrapartum assessment and identify high-risk cases requiring immediate intervention to reduce adverse neonatal outcomes.

METHODS

This study aimed to compare neonatal outcomes in laboring patients with fetal distress on cardiotocography (CTG) who had either clear liquor or meconium-stained liquor. Fetal distress was diagnosed based on CTG findings, which included a fetal heart rate of more than 160 or less than 110 beats per minute for more than 60 seconds, the presence of one or more decelerations below the baseline, or baseline variability less than 5 over a 20-minute CTG. Neonatal outcomes were assessed in terms of the APGAR score, with a score of less than 7 at 5 minutes considered poor, and admission to the neonatal intensive care unit (NICU) within 12 hours of birth.

The study was conducted in the Department of Gynecology, MNCH Hospital Faisalabad, using a comparative cross sectional design over six months. The sample size was calculated using the WHO sample size calculator for two proportions, with a Significance level of 5% and a power of study of 80%. The sample included 158 participants, divided into two groups of 79 each. Group A consisted of patients with fetal distress on CTG and clear liquor, while Group B included those with fetal distress on CTG and meconium-stained liquor. Participants were selected using non-probability convenience sampling. The inclusion criteria included pregnant women with term singleton pregnancies, cephalic presentation, and fetal distress on CTG with either clear or meconium-stained liquor. Exclusion criteria included pregnancies less than 37 weeks, pregnancies with antepartum hemorrhage, history of ruptured membranes, gross structural abnormalities of the fetus, or complicated obstetrical history.

Data collection commenced after approval from the Institutional Ethical Review Committee (MNCH/Admin/24/2318) and the College of Physicians and Surgeons Pakistan (CPSP). Informed consent was obtained from all participants after briefing them on the study's objectives and assuring confidentiality. Relevant details, such as maternal age, gestational age, CTG findings, color of liquor, and APGAR score at 5 minutes, were recorded on a pre-designed proforma. CTG was performed at the time of admission and repeated every 4 hours. In patients showing fetal distress, Kocker forceps were used under aseptic conditions to assess the color of the liquor, which was then recorded. Patients were followed until delivery, and the neonatal outcome was assessed based on APGAR score and NICU admission within 12 hours of birth.

Data were analyzed using SPSS version 25. Mean and standard deviation were calculated for continuous variables such as maternal age, gestational age, parity, duration of labor, and APGAR score at 5 minutes. Frequencies and percentages were computed for categorical variables such as level of education, occupation, onset of labor, mode of delivery, gender of the neonate, and neonatal outcomes (poor APGAR score and NICU admission). Neonatal outcomes between the two groups were compared using the chi-square test. Effect modifiers, including maternal age, gestational age, parity, level of education, occupation, onset of labor, mode of delivery, and gender of the neonate, were controlled through stratification. Post-stratification chi-square testing was performed to evaluate their impact on neonatal outcomes. A p-value of less

than 0.05 was considered statistically significant.

RESULTS

The clinical and demographic characteristics of patients in Group-A and Group-B were comparable, with no statistically significant differences observed between the two groups. The majority of patients in both groups were between 18–30 years old, comprising 55.7% of Group-A and 49.4% of Group-B (p = 0.426). In terms of gestational age, most patients had pregnancies between 37–40 weeks, representing 64.6% of Group-A and 62.0% of Group-B (p = 0.741). Educational levels were similar across the groups. Primary education was the most common, with 35.4% of patients in Group-A and 30.4% in Group-B (p = 0.778). Regarding occupational status, the majority of patients were housewives, accounting for 57.0% of Group-A and 58.2% of Group-B (p = 0.872). Parity was slightly higher in Group-B, where 74.7% of patients had 0–3 pregnancies, compared to 62.0% in Group-A (p = 0.087). Most patients experienced labor lasting ≤12 hours, comprising 84.8% of Group-A and 86.1% of Group-B (p = 0.822). When examining the mode of delivery, cesarean sections were more common in Group-A (51.9%) compared to Group-B (44.3%), though the difference was not statistically significant (p = 0.339). The gender distribution of neonates showed a higher percentage of male births in both groups, with 50.6% in Group-A and 59.5% in Group-B (p = 0.263).

Neonatal outcomes, including poor Apgar scores and NICU admissions, were assessed in both groups. Poor Apgar scores were slightly more common in Group-A, occurring in 59.5% of patients compared to 57.0% in Group-B, but the difference was not statistically significant (p = 0.747). NICU admissions were also comparable between the groups, with 65.8% in Group-A and 69.6% in Group-B (p = 0.610). (Table-I)

Stratified analysis of poor Apgar scores by clinical and demographic variables revealed some notable trends. Among patients aged 18–30 years, poor Apgar scores were observed in 51.0% of Group-A and 49.0% of Group-B (p = 0.663). Similarly, for patients older than 30 years, poor Apgar scores were slightly higher in Group-A (51.2%) compared to Group-B (48.8%, p = 0.366).

When stratified by gestational age, poor Apgar scores were more frequent in patients with a gestational age of 41–42 weeks in Group-A (58.3%) than in Group-B (41.7%, p = 0.05). Educational status, occupation, parity, and duration of labor showed no statistically significant differences in poor Apgar scores between the groups. Stratified analysis of NICU admissions revealed similar trends between the groups. Among patients aged 18–30 years, NICU admissions were slightly higher in Group-B (53.6%) compared to Group-A (46.4%, p = 0.084). For patients older than 30 years, NICU admissions were comparable between the groups, with 51.0% in Group-A and 49.0% in Group-B (p = 0.275).

No significant differences in NICU admissions were observed when stratified by gestational age, education level, occupation status, parity, or duration of labor. For male neonates, NICU admissions were more common in Group-B (57.6%) than Group-A (42.4%, p = 0.328). Among female neonates, NICU admissions were higher in Group-A (56.3%) compared to Group-B (43.8%, p = 0.747).

Overall, results revealed no significant differences in clinical or neonatal outcomes between the two groups across all stratifications.

DISCUSSION

This study aimed to compare neonatal outcomes in laboring patients with fetal distress on cardiotocography (CTG) who had either clear or meconium-stained amniotic fluid (MSAF). While neonatal outcomes such as poor Apgar scores and NICU admissions were slightly more frequent in the meconium-stained group (Group B), the differences were not statistically significant. These findings align with existing literature[9] and provide further evidence on the complex interplay of factors influencing perinatal outcomes.

	Variable		Group				Chi-Square p-value
			Group-A		Group-B		
			No.	(%)	No.	(%)	
Clinical and demographic information	Age (years)	18-30	44	55.7%	39	49.4%	0.426
		>30	35	44.3%	40	50.6%	
	Gestational Age (weeks)	37-40	51	64.6%	49	62.0%	0.741
		>40	28	35.4%	30	38.0%	
	Level of Education	Primary	28	35.4%	24	30.4%	0.778
		Up to Matric	24	30.4%	27	34.2%	
		Above Matric	27	34.2%	28	35.4%	
	Occupation Status	Employed	34	43.0%	33	41.8%	0.872
		Housewife	45	57.0%	46	58.2%	
	Parity	0-3	49	62.0%	59	74.7%	0.087
		>3	30	38.0%	20	25.3%	
	Duration of Labor (hours)	12 to 20 hrs	12	15.2%	11	13.9%	0.822
		2.00	67	84.8%	68	86.1%	
	Mode of Delivery	C-Section	41	51.9%	35	44.3%	0.339
		CVD	38	48.1%	44	55.7%	
	Gender of Neonate	Boy	40	50.6%	47	59.5%	0.263
		Girl	39	49.4%	32	40.5%	
Neonatal outcome	Poor Apgar Score	Yes	47	59.5%	45	57.0%	0.747
		No	32	40.5%	34	43.0%	
	NICU Admission	Yes	52	65.8%	55	69.6%	0.61
		No	27	34.2%	24	30.4%	

Table-I. Clinical/demographic information and clinical outcome of the patients

The clinical and demographic characteristics were comparable between the two groups. Most participants were aged 18–30 years, had gestational ages of 37–40 weeks, and experienced labor lasting ≤12 hours. These factors are consistent with the Ethiopian study[10], which highlighted that maternal age, gestational age, and duration of labor are critical determinants of neonatal outcomes in cases of MSAF.

When assessing neonatal outcomes, poor Apgar scores were observed in 59.5% of Group A and 57.0% of Group B. This contrasts slightly with the findings by Ahmad et al[8], which reported significantly higher poor Apgar scores in neonates with meconium-stained fluid (36.8%) compared to those with clear fluid (13.7%). The discrepancy could be attributed to differences in labor management protocols and patient populations. However, our findings are supported by B.E. Odongo et al[11] who also found no significant differences in Apgar scores between MSAF and non-MSAF groups similar to Mahapatra P and others.[12] Odongo's study[13] further emphasized that while MSAF is often associated with pathologic CTG tracings, these abnormalities may not necessarily translate to worse neonatal outcomes when interventions are timely and effective.

Similarly, NICU admissions were slightly higher in Group B (69.6%) compared to Group A (65.8%). Ahmad et al[8] also noted a marked increase in NICU admissions for neonates with MSAF (21.5%) versus clear fluid (6.2%). The higher rates in our study reflect a more conservative approach to neonatal care, where even borderline cases were admitted for closer observation.

Variable	Poor Apgar Score	Group-A	Group-B	Total	P-Value
Age (Years)					
18-30	Yes	25 (51.0%)	24 (49.0%)	49 (100.0%)	0.663
>30	Yes	22 (51.2%)	21 (48.8%)	43 (100.0%)	0.366
Gestational Age (Weeks)					
37-40	Yes	26 (46.4%)	30 (53.6%)	56 (100.0%)	0.302
41-42	Yes	21 (58.3%)	15 (41.7%)	36 (100.0%)	0.05
Level of Education					
Primary	Yes	19 (63.3%)	11 (36.7%)	30 (100.0%)	0.109
Upto Matric	Yes	13 (46.4%)	15 (53.6%)	28 (100.0%)	0.921
Above Matric	Yes	15 (44.1%)	19 (55.9%)	34 (100.0%)	0.348
Occupation Status					
Employed	Yes	23 (56.1%)	18 (43.9%)	41 (100.0%)	0.271
House Wife	Yes	24 (47.1%)	27 (52.9%)	51 (100.0%)	0.606
Parity					
0-3	Yes	31 (47.7%)	34 (52.3%)	65 (100.0%)	0.551
>3	Yes	16 (59.3%)	11 (40.7%)	27 (100.0%)	0.908
Duration of Labor (hours)					
4 to 12 hrs	Yes	5 (38.5%)	8 (61.5%)	13 (100.0%)	0.133
>12 hrs	Yes	42 (53.2%)	37 (46.8%)	79 (100.0%)	0.329
Gender of the neonate					
Boy	Yes	24 (48.0%)	26 (52.0%)	50 (100.0%)	0.66
Girl	Yes	23 (54.8%)	19 (45.2%)	42 (100.0%)	0.973

Table-II. Stratification of clinical outcome (poor apgar score)

This finding is consistent with Sadia Parween et al[14] who reported NICU admissions of 30% in the MSAF group compared to 13% in the non-MSAF group. The study by Suchismita Bera et al[14] also highlighted a high rate of NICU admissions (44%) in term pregnancies monitored with CTG, consistent with the notion that CTG-guided interventions often result in increased obstetric interventions without significantly improving neonatal outcomes in low-risk cases.

Stratified analysis offered additional insights into specific trends. Poor Apgar scores were slightly more common in neonates with gestational ages >40 weeks in Group A, which supports findings from the Ethiopian study[10], where post-term pregnancies were associated with higher adverse outcomes in the presence of MSAF. Similarly, NICU admissions were more frequent among male neonates in Group B (57.6%) and female neonates in Group A (56.3%).

Interestingly, educational status and occupational factors showed no significant impact on neonatal outcomes in our study. These findings deviate from the Ethiopian study[10], where maternal education and employment status were associated with delayed recognition and management of complications, thereby increasing the risk of poor outcomes.

The mode of delivery revealed an interesting trend, with cesarean sections being more frequent in Group A (51.9%) compared to Group B (44.3%). This aligns with Ahmad et al[8], which highlighted the increased likelihood of operative deliveries in cases with abnormal CTG findings, irrespective of the liquor type. Similarly, B.E. Odongo et al[11] and Sadia Parween et al[13] observed higher cesarean rates in MSAF cases, emphasizing the association between meconium staining and operative deliveries. Suchismita Bera et al[14] further emphasized the role of

Variable	NICU Admission	Group-A	Group-B	Total	P-Value
Age (Years)					
18-30	Yes	26 (46.4%)	30 (53.6%)	56 (100.0%)	0.084
>30	Yes	26 (51.0%)	25 (49.0%)	51 (100.0%)	0.275
Gestational Age (Weeks)					
37-40	Yes	27 (46.6%)	31 (53.4%)	58 (100.0%)	0.296
41-42	Yes	25 (51.0%)	24 (49.0%)	49 (100.0%)	0.329
Level of Education					
Primary	Yes	21 (60.0%)	14 (40.0%)	35 (100.0%)	0.202
Upto Matric	Yes	14 (38.9%)	22 (61.1%)	36 (100.0%)	0.07
Above Matric	Yes	17 (47.2%)	19 (52.8%)	36 (100.0%)	0.703
Occupation Status					
Employed	Yes	26 (54.2%)	22 (45.8%)	48 (100.0%)	0.373
House Wife	Yes	26 (44.1%)	33 (55.9%)	59 (100.0%)	0.163
Parity					
0-3	Yes	34 (44.7%)	42 (55.3%)	76 (100.0%)	0.839
>3	Yes	18 (58.1%)	13 (41.9%)	31 (100.0%)	0.721
Duration of Labor (hours)					
4 to 12 hrs	Yes	6 (42.9%)	8 (57.1%)	14 (100.0%)	0.265
>12	Yes	46 (49.5%)	47 (50.5%)	93 (100.0%)	0.954
Gender of neonate					
Boy	Yes	25 (42.4%)	34 (57.6%)	59 (100.0%)	0.328
Girl	Yes	27 (56.3%)	21 (43.8%)	48 (100.0%)	0.747

Table-III. Stratification of clinical outcome (NICU Admission)

CTG in identifying fetal distress and prompting obstetric intervention. However, their study cautioned against over-reliance on CTG in low-risk populations, as it may lead to unnecessary operative deliveries without significant benefits in neonatal outcomes. Our results suggest that careful monitoring and timely interventions may reduce the need for operative deliveries without compromising neonatal outcomes.

Our findings also complement the observations by Sadia Parween et al[13], who noted that severe MSAF (Grade 3) was strongly associated with neonatal complications, including meconium aspiration syndrome (MAS). While we did not stratify outcomes by meconium grade, incorporating this parameter in future studies could provide additional clarity on its role in adverse outcomes.

To further refine our understanding of MSAF and neonatal outcomes, future research should focus on identifying biomarkers such as fetal lactate levels or umbilical artery pH as adjuncts to CTG. Additionally, large-scale multicenter studies with stratification by meconium grade and mode of delivery could offer more robust insights. Collaborative efforts to standardize intrapartum management protocols across regions would also help address disparities observed in different healthcare settings.

CONCLUSION

This study found no significant differences in neonatal outcomes between patients with fetal distress on CTG and clear or meconium-stained liquor. Stratified analyses provided valuable insights into demographic and clinical factors influencing neonatal outcomes. These findings underscore the importance of individualized management and suggest that MSAF, while a potential risk factor, does not independently

dictate adverse outcomes in the presence of abnormal CTG findings.

LIMITATIONS

This study has several limitations. First, the use of a non-probability convenience sampling method may introduce selection bias, limiting the generalizability of the findings. Second, the study was conducted in a single tertiary care hospital, which may not fully represent outcomes in different healthcare settings. Third, the sample size, while calculated for statistical power, may still be relatively small to detect subtle differences in neonatal outcomes. Fourth, the study did not account for intrauterine fetal monitoring beyond CTG, such as fetal scalp pH or Doppler studies, which could provide more precise assessments of fetal distress. Lastly, potential confounders such as maternal comorbidities, labor induction methods, and neonatal interventions were not fully controlled, which could influence neonatal outcomes.

RECOMMENDATIONS

Future studies should utilize a larger, multi-center sample with random sampling to enhance the generalizability of findings. The inclusion of additional fetal monitoring techniques, such as Doppler ultrasound or fetal scalp pH, could improve the accuracy of fetal distress diagnosis. Further research should also investigate the long-term neurodevelopmental outcomes of neonates with poor Apgar scores or NICU admissions to assess the impact of meconium-stained liquor on long-term health. Additionally, implementing standardized labor management protocols based on CTG findings and liquor characteristics may help optimize neonatal outcomes.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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REFERENCES

1. Gupta K, Haritwal A, Makhija B, Bhandari R. **Is fetal CTG a reliable indicator of fetal distress? A prospective study on relationship between CTG suspected fetal distress and immediate postpartum umbilical cord blood pH.** J Clin Med Kaz. 2022; 19(1):57-64.

2. Lakhno IV, Uzel K. **Diagnosing antenatal fetal distress.** Ginekol Pol. 2021 Jun 9. doi: 10.5603/GP.a2021.0100. Epub ahead of print. PMID: 34105749.

3. Gallo DM, Romero R, Bosco M, Gotsch F, Jaiman S, Jung E, et al. **Meconium-stained amniotic fluid.** Am J Obstet Gynecol. 2023 May; 228(5S):S1158-S1178. doi: 10.1016/j.ajog.2022.11.1283. Epub 2023 Apr 1. PMID: 37012128; PMCID: PMC10291742.

4. Khan IU, Aslam N, Anis FM, Mirza S, AlOwayed A, Aljuaid RM, et al. **Amniotic fluid classification and artificial intelligence: Challenges and opportunities.** Sensors (Basel). 2022 Jun 17; 22(12):4570. doi: 10.3390/s22124570. PMID: 35746352; PMCID: PMC9228529.

5. Parween S, Prasad D, Poonam P, Ahmar R, Sinha A, Ranjana R, et al. **Impact of meconium-stained amniotic fluid on neonatal outcome in a tertiary hospital.** Cureus. 2022; 14(4): e24464.

6. Rafia R, Abid Hossain M, Manisha B, Syed Shafi A, Salahuddin M, Nahid-E-Subha. **Risk factors associated with meconium-stained amniotic fluid in neonates: A tertiary center experience from Bangladesh.** Acad J Ped Neonatol. 2021; 10:e555840.

7. Sarmishta M. **Meconium-Stained Liquor and Its maternal and Foetal Outcome.** J Evol Med Dent Sci. 2019; 8(49):3653-7.

8. Fareed A, Haroon Y, Ahmad A. **To compare neonatal outcome in fetal distress on cardiotocography in clear liquor versus meconium stained liquor.** The Professional Medical Journal. 2019 Sep 10;26(09):1562-6. DOI: https://doi.org/10.29309/TPMJ/2019.26.09.4025

9. Mohammad N, Jamal T, Sohaila A, Ali SR. **Meconium stained liquor and its neonatal outcome.** Pak J Med Sci. 2018 Nov-Dec; 34(6):1392-96. doi: 10.12669/pjms.346.15349. PMID: 30559791; PMCID: PMC6290233.

10. Tolu LB, Birara M, Teshome T, Feyissa GT. **Perinatal outcome of meconium-stained amniotic fluid among labouring mothers at teaching referral hospital in urban Ethiopia.** PLoS ONE. 2020; 15(11): e0242025.

11. Odongo BE, Ndavi PM, Gachuno OW, Sequeira E. **Cardiotocography and perinatal outcome in women with and without meconium stained liquor.** East Afr Med J. 2010 May; 87(5):199-204. doi: 10.4314/eamj.v87i5.63074. PMID: 23057282.

12. Mahapatra P, Dash S, Jena S, Sekhara S. **Perinatal outcome of meconium stained amniotic fluid.** JPTCP 2021; 28(2):177-9

13. Parween S, Prasad D, Poonam P, Ahmar R, Sinha A, Ranjana R. **Impact of meconium-stained amniotic fluid on neonatal outcome in a Tertiary Hospital.** Cureus. 2022 Apr 25; 14(4):e24464. doi: 10.7759/cureus.24464. PMID: 35637798; PMCID: PMC9131707.

14. Bera S, Deb D, Ballov R, Chakraborty S. **Efficacy of admission cardiotocography on neonatal outcome in term pregnancy admitted in labor in a rural-based tertiary care center: A prospective study.** Asian Journal of Medical Sciences. 2022 Jun 1; 13(6):139-44.

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1	**Sana Riffat:** Data collection, paper writing.
2	**Sana Tariq:** Data collection, analysis, paper writing.
3	**Samar Amin:** Discussion writing, review of manuscript.
4	**Sanober Faisal:** Review of manuscript.
5	**Ali Raza:** Data entry and literature review.
6	**Ayesha Tariq:** Data entry and literature review.
7	**Muhammad Ahsan:** Data analysis and manuscript writing.