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Editorial

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Artificial Intelligence in Cardiology

Joyabrata Das[1*]

Artificial Intelligence (AI) was first coined by American scientist John McCarthy in 1955, who is also considered co-founder of the field Artificial Intelligence.

Artificial Intelligence (AI) is an agent that is able to perform tasks that would require human intelligence. It is a sub-field of computer science that includes the creation of intelligent machines and software that work and react like human beings. Artificial Intelligence is transforming the nature of almost everything which is connected to human life and healthcare etc. In near future it is leading humanity towards making this planet a better place to live.

Artificial Intelligence (AI) is a fast-growing technology that has great potential for advancements in cardiovascular medicine. Cardiovascular Diseases (CVDs) are currently diagnosed through a comprehensive patient evaluation that includes a review of the patient's medical history, biomarker analysis, physical examinations and specialized testing. The clinical expertise and experience of medical practitioners are required for the interpretation of test results and the findings are used to devise treatment plans for patients.

Cardiovascular disorders, also known as CVDs, encompass various medical conditions that arise from irregularities in the functioning of the heart (such as cardiomyopathy, valvular diseases, and arrhythmia) or cardiac artery disease and peripheral arterial disease. If left untreated, these conditions can trigger severe health complications such as heart failure, heart attack and stroke.[1] World Health Organization (WHO) reported that CVDs remain the primary cause of mortality globally, resulting in about 17.9 million fatalities, which accounts for 32% of all global deaths.[2] Moreover, the WHO anticipates that the number of deaths caused by CVDs will persistently increase, with an estimated 23.6 million deaths projected to occur by 2030.[3] The current procedures utilized for diagnosing CVDs entail a comprehensive evaluation of patients through analysis of their medical history, scrutiny of biomarkers, conduction of physical examinations and administration of specialized tests.[4] The interpretation of examination results necessitates the clinical expertise and experience of medical practitioners. These results are subsequently utilized to formulate assessments and treatment strategies for patients. However, this approach has been shown to be flawed and inefficient owing to variations in how physicians perform the procedure and the likelihood of errors occurring.[5]

Recent technological innovations based on Artificial Intelligence (AI) have been implemented in healthcare to reduce the likelihood of inaccurate patient diagnoses and treatments.[6] AI integration in cardiology began with diagnostic algorithms in the 1980s and 1990s.[7] Machine Learning (ML) techniques, particularly in cardiac imaging, helped diagnose conditions like coronary artery disease, heart failure and myocardial infarction. Deep Learning (DL) algorithms, like Convolutional Neural Network (CNN), demonstrated exceptional capabilities in cardiac image analysis. AI was also used for risk assessment and prediction in cardiovascular diseases, enabling personalized patient care. The use of AI in cardiovascular medicine is becoming increasingly prevalent, with the capacity to enhance the efficiency of work processes, achieve cost savings, and enhance the quality of decision-making.[8,9] Various disciplines of science and industry, including medicine, are utilizing AI for the diagnosis, treatment, prediction of diseases and pre-procedural planning. AI can be used in cardiovascular applications in two main ways: Virtually and Physically.[10] The virtual part regulates health management systems such as medical imaging analysis software and electronic health records using ML, DL and Natural Language Processing (NLP). The physical part of AI in cardiology can be applied

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through robotic invasive treatments. The use of AI in medicine is expected to make a big difference in how diagnosis and treatment can be improved. By integrating AI into the healthcare domain, workflow efficiency, cost-effectiveness and decision-making across various scientific disciplines, including medicine, can be significantly enhanced. Although the potential advantages of AI in cardiovascular care are substantial, it is essential to recognize and tackle the existing constraints.

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Original Article

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Demographic and Clinical Profiles of Burn Fatalities in Bangladesh: A Morgue Based Study of 405 Autopsies

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ABSTRACT

Introduction: Deaths due to burn are an important public health related issue in a developing country like Bangladesh.Burn injuries have been described as the most serious injuries that may afflict a human being. It is a considerable one of the commonest cause of unnatural deaths in Bangladesh. Females, child, rural dwellers and populations of low socioeconomic condition are mostly suffered by burn injuries. The purpose of thisretrospective study was to record and evaluate the actual and potential causes and the magnitude of the fatal burn injuries.

Materials and methods: This retrospective cross-sectional study was conducted among the burn death victims at Dhaka Medical College, Morgue, during the period of January 2023-December 2023

Results: An analysis of autopsy records revealed 405 (11.27%) cases of burn injuries among the total 3589 autopsies done over 1 year period (January 2023-December 2023) in the mortuary of Dhaka Medical College. Among the total burn cases the flame burns were seen in 76.79% of the victims, out of these fire was the commonest cause (71.71%). The majority of deaths (21.89%) occurred between 31 and 40 years of age group with a preponderance of males (66.73%) female maleratio being 1:2. Most of the victims died from neurogenic shock (54.73%) followed by septicemia (23.59%). The majority of deaths occurred within a week (80.82%) and the percentages of burns (TBSA) over 50% were observed in most of the cases (83.27%). Accidental death was the most common manner of burn death accounting for 331 (81.65%)and the commonest location for burn deaths was home locations 259 (63.89%). Highest incidence of burn occurred in winter 170 (42.03%) regarding variations in burn injury with time of day, the incidence is high in night 219 (54.07%) day night ratio being 1:1.18.

Conclusion: The results of this study provide the necessary information's to address it as a public health relatedproblem and develop proper burn prevention programs, thus reducing the frequency of burns and burn-related deaths.

KEY WORDS

Burn deaths; Flame burns; Neurogenic shock; Septicemia; TBSA.

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INTRODUCTION

Most thermal injuries occur from structure fires. The most important question to answer is if the decedent was alive or dead during the fire. The answer to this question enables the investigator to distinguish between homicide and other manners of death and it provides a challenging problem in the distinction between ante-mortem and post-mortem burn, which may have serious criminal aspects.[1] Burn injury is a common type of traumatic injury, causing considerable morbidity and mortality.[2] Moreover, burns are the most expensive traumatic injuries, because of prolong hospitalization and rehabilitation and costly wound and scar treatment.[3, 4]

Burns are dry heat injuries produced by application of dry heat such as flame, radiant heat or some heated solid substance like metal or glass to the body. Burn is restricted to the local effects of dry heat. Moist heat leading to scalds and corrosive poisons resulting in corrosive burns. Electric spark, discharges, flashes and lightening leads to electric burns. Burn due to Xray and Ultraviolet rayare also classified as a burn for medicolegal purposes.[5]

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For management of burn injuries patients are stay long in all the hospitals for better treatment.[6] According to the World Health Organization, 1,80,000 individuals died of fire-related burns in 2023,Non fatal burn injuries are a leading cause of morbidity, burns occur mainly in the home and workplace and 95% of these deaths occurred in low and middle-income countries. In many high income countries, burn death gradually decreasing but the rate of child death due to burn 7 times higher in low and middle income countries.[7,8] The approach to burn prevention, depends on the sound knowledge of etiological patterns of burn injuries.[9]

In Bangladesh burn considered as major health problems that are associated with high mortality and morbidity. Dhaka, the capital of Bangladesh, is one of the most crowded cities in the world. The population of Greater Dhaka, according to the most recently published statistics is 23.210 million inhabitants.[10]

Our aim of this study was to record and evaluate the causes and the magnitude of the fatal burn injuries retrospectively.

MATERIALS AND METHODS

This retrospective cross sectional study was conducted among burn death victims at the Dhaka Medical College (DMC) Morgue during the period of January 2023-December 2023. Of the 3589 autopsies performed on all types of unnatural deaths between above period, 405 (11.27%) were the cases of burns. These 405 fatal burn cases form the material of this study. Various identification data of the study subjects were noted from the inquest report accompanying the dead bodies, information from the victim's attendants and 3rd copy of post mortem reports preserved in the Forensic Medicine Department of Dhaka Medical College. From ethical points of view necessary consent of doctors who performed the autopsies and relatives of victims have been taken. The data collection technique and approval was taken from Dhaka Medical College ethical clearance committee.

RESULTS

A total of 3589 cases of unnatural deaths were autopsied in DMC Morgue, number of deaths by burn were 405 (11.27%). Among the total burn cases flame burn was the commonest cause 311 (76.79%), out of thesefire was the commonest cause 290 (71.71%) followed by electric burn 78 (19.3%) (Table I).

Table I Distribution of causative agents of burning (n=405)

Causative agents	No. of victim	Percentage
Fire	290	71.71%
Pouring of kerosene	21	5.08%
Electric burn	78	19.3%
Scald	00	00%
Chemical burn	16	3.91%
Total	405	100%

Among the burn deaths, 270 (66.73%) out of 405 were male and 135 (33.27%) were females with female male ratio being 1:2 (Table II).

Table II Sex distribution of burn victims (n=405)

Sex	No. of victim	Percentage	Ratio
Male	270	66.73%	Female : male
Female	135	33.27%	1 : 2
Total	405	100%	

Highest incidence of burn was found in 31-40 years age group 96 (22.02%) (Figure-1) followed by 21-30 age group of 92 (21.1%).

Figure 1 Age distribution of burn victims (n=405)

The study shows that majority of burn victims were died due to neurogenic shock 222 (54.73%) (Table III) followed by septicemia 96 (23.59%).

Table III Cause of death in burns (n=405)

Cause of death	No. of victim	Percentage
Neurogenic shock	222	54.73%
Septicaemia	96	23.59%
Hypovolemic shock	48	11.83%
Asphyxia	24	5.89%
Multi organ failure	15	3.96%
Total	405	100%

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The majority of deaths (80.82%) due to burns occurred within a week of the incident. During this period the maximum number of deaths were 259(63.89%), occurred within 6 hours. 56 (13.89%) deaths occurred within 1-2 weeks post-injury period as shown in Figure 2.

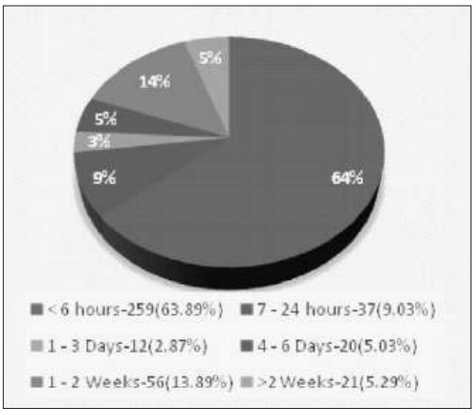

Figure 2 Duration of survive of the victim (n=405)

It was observed thatthe percentages of burns (TBSA) over 50% were in most of the cases (83.27%) and maximum number of victims 162(39.89%) weresustained 50-70% of total body surface area (TBSA) burns (Figure 3) &(Table- 4) followed by 101(24.93%) victims sustained 71-90% total body surface area (TBSA) burns.

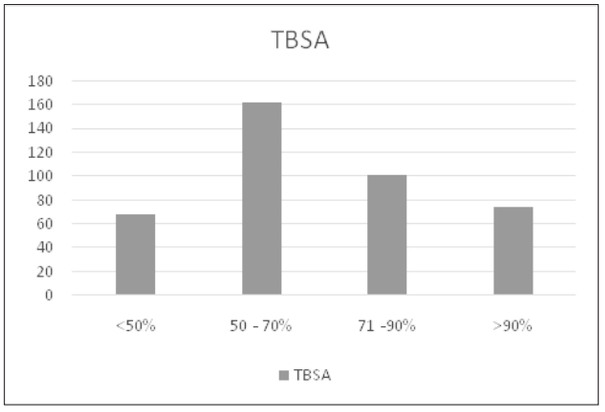

Figure 3 The median burn percent (TBSA) (n=405)

Table IV Distribution of total body surface area (TBSA) (n=405)

TBSA	No. of victim	Percentage
<50%	68	16.73%
50 – 70%	162	39.89%
71 – 90%	101	24.93%
>90%	74	18.45%
Total	405	100%

Accidental death was the most common manner of burn death accounting for 331 (81.63%) (Table V) followed by suicidal death were 53 (13.17%).

Table V Manner distribution of burn victims (n=405)

Manner	No. of victim	Percentage
Accidental	331	81.63%
Suicidal	53	13.17%
Homicidal	21	5.20%
Total	405	100%

Table VI shows the commonest location for burn deaths was home locations 259 (63.89%), followed by work locations 110 (27.13%) and a small percentage in outdoor locations 36 (8.98%).

Table VI Burn victims in relation to location (n=405)

Manner	No. of victim	Percentage
Home	259	63.89%
Work place	110	27.13%
Outdoor	36	8.98%
Total	405	100%

Highest incidence of burn occurred in winter 170 (42.03%) (Table VII) followed by summer 99 (24.41%).

Table VII Seasonal variation of burn deaths. (n=405)

Season	No. of victim	Percentage
Autumn	71	17.59%
Winter	170	42.03%
Spring	65	15.97%
Summer	99	24.41%
Total	405	100%

Regarding variations in burn injury with time of day, the incidence is high in night 235(53.9%) more than day 201(46.1%) with day night ratio being 1: 1.18 (Table VIII).

Table VIII Diurnal variation of burn deaths. (n=405)

Time of Day	No. of victim	Percentage	Ratio
Day	186	45.93%	Day : Night
Night	219	54.07%	1 : 1.18
Total	405	100%	

DISCUSSION

Burn is a problem prevalent worldwide, especially in developing countries.[11,12] Depends upon the available information's regarding the incidence of burns and burn deaths, this should be considered as a significant problem in Bangladesh. As many as 27,624 fire incidents across the country in 2023 according to Bangladesh Fire service and civil defense headquarters. At least 77 fire incidents were recorded in a day on average. Of the incidents, 3, 334 fire accidents occurred in March, 3, 141 in April, 3, 235 in May, 2, 646 in

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January, 2, 713 in February and 2450 in June. In the present study, flame is the major cause of burns (96.09%) which is consistent with the study from Manipal.[13] The higher incidence of burn deaths among males (66.73%) was observed and the sex ratio being almost two times higher in male throughout the study period, while in Sri Lanka burn cases were observed to be more common among males in all age groups except in the elderly.[12] Contrarily in India burn is the only unnatural cause in which female not only outnumbered the males, but the sex ratio being almost three times higher in female.[14] In the present study, about 66.28% of the victims were in the age group of 11–50 years with peak incidence between 21 - 40 years (43.28%), which are similar to the observation of Singh et al. from Chandigarh who reported two thirds of fatal burn cases in the young age group (21–40 years).[15] In other countries such as Iran 93% of burn victims were below 60 years with peak incidence between 16 and 25 years.[16] Respiratory complications (Pneumonia, ARDS, pulmonary embolism) are major cause of death responsible for up to 34% among adults, and even up to 45% among the elderly.[17,18] In the present study, the major cause of death was neurogenic shock in 54.73% cases, followed by Septicemia-(23.59%) while septicemia was the leading cause of death as reported by Rahul et al. and Stefan.[19, 20] Other causes were hypovolemic shock, asphyxia, multi organ failure, etc. as also mentioned in the result.In the current study, 72.92% cases died within a few minutes to 24 h, 7.90% cases within a week, signifying that the burns are rapidly fatal. Similarly Virendra et al. also reported death from burns within a week in 60.8% victims.[13] In the present series, the overwhelming majority (83.27%) of the victims had more than 50% of Total Body Surface Area (TBSA) burns indicating the incompatibility with life even at a tertiary care center. Similarly 80% mortality rate in burns over 40–50% TBSA has been reported from India.[13] Though the majority of the incidents are accidental in nature (81.65%) suicidal (13.17%) and homicidal (5.20%) cases were also observed. As noted with other studies, accidental burning was the commonest manner of deaths due to burning followed by suicidal and homicidal burning.[21,22] Regarding accident location, our study showed that the home ranked first (63.89%) followed by workplace (27.13%) then outdoor locations (8.98%). This comes in accordance with the findings of other reporter[23].Seasonal variations in our study showed that burn deaths occurred mostly in winter (42.03%) followed by summer (24.41%). This might be due to the fact that, in winter, there is more need for hot water for drinking and bathing. The traditional kerosene stove, which is extensively used in the slum areas for cooking and providing the necessary boiling water for bathing, lacks any safety measures. Thus, flame burns and scald burns are more common in our country. This fact has been previously highlighted by the study from other low income country and diurnal variation in our study showed that burn deaths occurred mostly at night (54.07%) and day night ratio being close almost (1:1.18) in which reports from developed countries had attributed winter peaks in hospital admissions to the greater use of heating during colder and longer nights.[24,25]

CONCLUSION

Burns have always been considered as one of the most destructive injuries, causing not only death but also major economic and psychological impacts and long term somatic sequelaeto the burn victims.The present autopsy-based study has highlighted some important features pertaining to burn deaths in Bangladesh which provide the necessary information's to address it as a public health related problems and develop proper burn prevention programs, thereby reducing the frequency of burns and burn-related deaths. The most important step in reducing the burn incidence is through mass education.

RECOMMENDATION

Steps should be taken for improvement of public awareness by the concern authority, training of communities in first aid, modernized life saving equipments and proper implementation of law. Developed countries lowering the rates of burn deaths, through a combined action of preventive strategies and improvement in the treatment pattern of burn affected people.

DISCLOSURE

All the authors declared no competing interest.

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Original Article

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Retrospective Case Series of 376 Hanging Suicides in Bangladesh : Epidemiological and Forensic Perspectives

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ABSTRACT

Background: Suicidemeans self destruction. One can takes up any method to cause harm to himself. In Bangladesh there are different methods like ingestion of poison, hanging, drug overdose and in other countries most prevailing methods are gunshot. Suicide by hanging is common in Bangladesh. This study was done to identify the socio economic factors, other associated factors and post mortem examination finding of hanging cases.

Material and methods: This retrospective study was conducted among victims of hanging brought to Dhaka Medical College morgue during the period January 2015 to December 2015. Various identification data of the victim like age, sex, marital status, permanent address, suspension of dead body along with places of incidence, time and suspected causes of death were noted from the inquest report accompanying the dead bodies.

Results: A total 376 cases of hanging was examined. Maximum no. of cases were within the age limit of 21-30(36%) there were male predominance 208(55.32%) associated features of hanging we found maximum due to family disputes 110(29.3%) most of them used soft material as ligature material 245(64.6%).

Conclusion: The high incidence of hanging in young male adults impose a serious effect in our economy.

KEY WORDS
Hanging; Poison; Suicide; Victim.

INTRODUCTION

Suicide in Bangladesh is mostly neglected public health problem. This negligence leading to increasing number of suicidal cases across the country. According to a report by The Daily Star, from 2002 to 2009, 73,389 people committed suicide in Bangladesh. Of these 73,389 people, 31,857 people hanged themselves and 41,532 swallowed poison to commit suicide.[1] People causing self harms by different methods. Suicide by hanging is one of the most commonest method among all methods.According to police statistics, from 2002 to 2009, 73,389 people committed suicide in Bangladesh. Of these 73,389 people, 31,857 people hanged themselves and 41,532 swallowed poison to commit suicide.[2] Hanging is an asphyxia death which is produced by pressure over the neck area. Minimum pressure required to produce asphyxia is 2 kgs. A small rope around the neck may render a person unconscious in 15 seconds, making it a painless and quick death option.[3]

Hanging means The suspension of the body by a ligature that encircles the neck, with the restricting force being the weight of the body itself, produces death by asphyxiation.[4] A person can hang himself either partially or wholly. When any part of the body touches the ground is called partial hanging and when there is no connection between body and ground it is called complete hanging.[5] All cases of hanging are considered to be suicidal until the contrary is proved.[6]

Hanging produces painless death in person and it is cost effective as only ligature material is required. More common ii Bangladesh because most of the population is living below poverty limit. They have scarcity of job, drug addiction, family problem, mental problems and there is easy availability of the ligature material used. Passion, disappointments, loss of property, misfortune, financial losses, poverty, disgust with life, physical and mental sufferings, religious mania, unhappy love, failures in many aspects, marital problems, jealous, unbearable fear and pain are some of the commonly

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known reasons for hanging. These will vary widely from country to country, between religions and socio-economic classless. This study was done to identify the socio economic factors, other associated factors and post mortem examination finding of hanging cases. Marital problems is the leading cause in developing countries like Bangladesh.[7]

METHOD AND MATERIALS

This retrospective study was conducted among victims of hanging brought to Dhaka Medical College morgue during the period January 2015 to December 2015. Various identification data of the victim like age, sex, marital status, permanent address, suspension of dead body along with places of incidence, time and suspected causes of death were noted from the inquest report accompanying the dead bodies. The preliminary investigating report submitted by the police (inquest report) played very important role in this regards. Other related information were gathered from the victims attendants. Points regarding knot of ligature material, injury to neck structures, stomach condition were noted during post mortem examinations.

RESULTS

Total number of hanging cases were 376. The maximum number of cases were found in the group of 21-30 years (36%) (Table-I). Male outnumbered the females in total number of hanging cases 208(55.32%) (Table-II). Associated features for hanging was found family dispute 110(29.3%) (Table-III). Most of the cases they used soft material 245(64.6%). External findings of hanging cases there was dried marks of dribbling saliva 376(100%). Internal findings parchmentization was found in the all cases 376(100%).

Table I Age Distribution of suicide by Hanging (n=376)

Age	No.	Percentage
0-10	30	8%
11-20	110	29.3%
21-30	135	36%
31-40	65	17.3%
41-50	20	5.32%
51-60	14	3.72%
>60	2	0.53%

Table II Sex Distribution of suicide by Hanging (n=376)

Sex	No.	Percentage
Male	208	55.32%
Female	168	44.68%

Table III Distribution of Associated features for hanging (n=376)

Associated Features	No.	Percentage
Family Dispute	110	29.3%
Violence against female	105	28%
Economic Crisis	45	12%
Chronic Illness	10	2.6%
Mentally Imbalance	25	6.6%
Drug addiction	81	21.5%

Table IV Distribution of Ligature material suicide by Hanging (n=376)

Ligature Material	No.	Percentage
Soft Material (Orna, Scarf, Shari)	245	64.6%
Nylon Rope	32	8.51%
Electric ware	13	3.46%
Jute Rope	86	22.9%

Table V Distribution of External Injuries of suicide by Hanging (n=376)

External Findings	No.	Percentage
Dried mark of dribbling of saliva from angle of the mouth	376	100%
Ligature Mark- Oblique,non continuous	376	100%
High up of the thyroid cartilage	367	98%
At the level of the thyroid cartilage	9	2%
Below the thyroid cartilage	0	0%
Post mortem staining in the legs, feet, hands	203	54%
Presence of other injuries	5	14.9%
Discharge of urine	103	27.4%

*Multiple Response.

Table VI Distribution of External findings of suicide by Hanging (n=376)

Internal Findings	No.	Percentage
Parchmentization	376	100%
Fracture of Thyroid Cartilage	00	0%
Fracture of Hyoid bone	20	5.32%

*Multiple Response.

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DISCUSSION

Suicide is increasing day by day around the whole world. Among different method suicide by hanging is one of the most choosen methods.[8]

In our study we have found that hanging is done more by males 208(55.32%). Similar findings is seen in study of Ali E et al.[9] Suicidal rates in around the world is also higher in males.[10] In United kingdom suicide is three or four times more in males than in females irrespective of age.[11]

We have seen that the age between 21-30, 135(36%) commits suicide by hanging.This age is more vulnerable because of emotional triggers and peer pressure. Moreover, this age groups belongs to the majority of students where other factors such as failure in the exam, arguments with friends or family may bepresented as a cause. Same incidence has found by Ahmad M, Hossain MZ.[12]

Howevere, differenct factor play role in committing suicide.We have discussed about some factors in our study among them most common factors being family disputes. This factor may have caused by different other factors like economical crisis, personal relationship crisis, drug addiction and others. This finding is consistent with the study of Eddlesto M et al.[13]

In case of committing suicide by hanging everyone needs a ligature material to be hanged.And in different parts of the world people use different materials, most common being any soft material that may be clothes like shari, dupatta, scarfetc.We have found 245 cases (64.6%) used this soft material in our study. They hanged themselves with ceiling fans using tools or some other materials for standing. So most of the cases are being the complete suspension. This finding is common in the study of Benne et al.[14]

In post mortem examination between different types of findings we have seen that all the cases showed dried mark of dribbling of saliva 376 (100%). other external findings are Post mortem staining is seen in hands and feet in 203 (54%) discharge of urine in 103(27.4%), other injuries found in 56 (14.9%). And in internal findings parchmentization is found in 376(100%). Similar findings have been shown by Patel A P et al.[15]

CONCLUSION

The high incidence of hanging in young male adults impose a serious effect in our economy. It is also a least attended public health problem. Various factors play role in this social problem.

RECOMMENDATION

Multifactorial approach is needed to solve this problem.Raising public awareness program,increasing job facilities,mental health awareness programs could be included in it.

DISCLOSURE

All the authors declared no competing interest.

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Original Article

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Adverse Events in Laparoscopic Appendectomy Under Spinal Anesthesia: Intraoperative and Postoperative Perspectives

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ABSTRACT

Background: Laparoscopic Appendectomy (LA) has become the preferred approach for treating acute appendicitis due to its minimally invasive nature, which leads to reduced postoperative discomfort, shorter hospital stays, and faster recovery compared to open appendectomy. This study evaluates the efficacy and safety of LA performed under spinal anesthesia in a resource-limited setting, aiming to provide insights into patient outcomes and adverse effects.

Materials and methods: This prospective observational study was conducted at Brahman Baria Medical College Hospital over a 28-month period from February 2022 to June 2024, the study included 188 patients (108 females, 80 males, mean age 25.5 years) diagnosed with acute appendicitis. Patients were selected based on specific inclusion criteria and underwent routine blood tests and ultrasound examinations.

Results: The results indicated a mean surgery time of 22.80 minutes and a mean hospital stay of 2 days. Intraoperative complications were minimal, with shoulder pain and nausea being the most common. Postoperative adverse events included nausea, vomiting, and mild shoulder pain, showcasing that while complications were present, they were generally mild and manageable.

Conclusion: The study highlights the effectiveness and safety of LA in a limited-resource environment, contrasting outcomes with those in higher-income countries, emphasizing the importance of healthcare infrastructure and technology in surgical outcomes.

KEY WORDS

Acute appendicitis; Laparoscopic appendectomy; Patient outcomes; Resource-limited settings; Spinal anesthesia.

INTRODUCTION

Laparoscopic Appendectomy (LA) has gained popularity as a surgical treatment for acute appendicitis because of its less invasive nature, reduced postoperative discomfort, shorter hospital stays and quicker recovery time than open appendectomy. One of the most frequent surgical emergencies in the world is laparoscopic appendectomy. Additionally, it can impact people of any age, children are more likely to experience it.[1] Major outcomeslike perforation and peritonitis can arise if treatment is delayed.[2] Therefore, early diagnosis and treatment depend on preventing side effects and guaranteeing a full recovery.Although the advantages of laparoscopic appendicectomy are well acknowledged, clinical interest in its efficacy and safety is still growing, especially concerning intraoperative and postoperative adverse effects.[3] Whereas they are rare, these incidents can range from minor issues like wound infections to more catastrophic outcomes including organ damage and anesthetic issues.[4-5] Comprehending these hazards is essential for enhancing patient results and directing surgical choices. Furthermore, tailoring surgical methods and preoperative preparations requires an awareness of patient-specific factors such as age, gender, Body Mass Index (BMI) and concurrent illnesses that may affect complication rates.[6]Laparoscopic Appendectomy is typically characterized clinically by pain that goes from the periumbilical region to the right iliac fossa, as well as fever, vomiting, leukocytosis and soreness at

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McBurney's point.[7] Even while these symptoms are considered common, unexpected presentations and parallels with other gastrointestinal illnesses might make diagnosis challenging. In locations with limited resources, where modern imaging modalities may not be readily available, scoring systems such as the Alvarado score have been developed to increase diagnostic accuracy.[8-9] Furthermore, preoperative examinations, such as basic blood tests and sonographic exams, are critical for verifying the diagnosis and identifying any potential contraindications to laparoscopic surgery. Laparoscopic Appendicectomy has limitations despite its many advantages.[10] Additionally, some patient conditions, such as severe obesity, appendicular abscess, or extensive peritonitis, may pose significant challenges during laparoscopic procedures, necessitating careful patient selection to lower risks.[11] The kind of anesthetic used is another crucial consideration; in some cases, spinal anesthesia is becoming a good substitute for general anesthesia.[12] Although spinal anesthetics have benefits including improved postoperative pain management, fewer airway problems, and quicker recovery, they are contraindicated in some circumstances, such as spinal anomalies, blood diseases, and excruciating back pain.Every patient was thoroughly advised of the hazards, including the possibility of being converted to general anesthesia and was asked to fill out standardized questionnaires on their surgical experience. This study intends to provide a thorough understanding of LA's impact on treatment quality and patient satisfaction by including patient perspectives.The objectives of this study are intended to close gaps in the literature by offering thorough information on the efficacy and safety of laparoscopic surgery performed under spinal anesthesia when resources are scarce.

MATERIALS AND METHODS

This prospective observational study was conducted at BrahmanBaria Medical College Hospital from February 2022 to June 2024. It was carried out according to the approval of the Hospital Ethics Committee. The study was conducted over a 28-month period where LA was performed on 188 patients (108 female and 80 male) of ASA grade I or II, who presented with acute appendicitis. Inclusion criteria included, pain in the right iliac fossa, shifting of periumbilac pain to the right iliac fossa, muscle guarding, tenderness at McBurney's point, vomiting, fever, leukocytosis and age more than 12 years and clinical scores for diagnosing Acute Appendicitis by Alvarado score.[8] All the patients had routine blood tests and a sonographic examination. Patients with generalized peritonitis, appendicular abscess or perforation, and a palpable mass, any cause of contraindication for spinal anesthesia or pneumoperitoneum, lack of cooperation, psychiatric disease, bleeding disorders, known sensibility to local or narcotic analgesics, being younger than 12 or older than 45 years of age, infection at spinal anesthesia injection site, spinal deformity or severe back pain, history of bradyarrhythmia, obesity (Body mass index > 30 kg/m^2) other major systemic illness like uncontrolled diabetes or uncontrolled hypertension, history of allergy or hypersensitivity to local anesthetics, a history of abdominal surgery, or pregnancy were excluded from the study. The patients who needed to convert the procedure to open appendicectomy were excluded from the study. All patients were informed about spinal anesthesia in detail. The patients were informed about the risk of conversion to general anesthesia and all patients provided informed consent. Simple questionnaire forms were developed so patients could comment on the operation. Data were analyzed using SPSS version 26.

RESULTS

The study found that, The mean age of patients was 25.5 years ranging from 12 to 45 years, with a mean BMI of 22.55 kg/m^2 ranging from 16.60 to 29.00 kg/m^2 (Table I). The mean age of study population is 25.5±9.25 indicating a young adult population with moderate variability in age. The male female ratio 80:108. Mean body mass index was 22.55±4.05. Mean surgery time 22.80 minutes' ±10.50 seconds. Moreover, mean total surgery time 52.10 minutes' ±16.50 seconds. Mean hospital stay was 2±1 suggesting that the procedure required a short hospitalization. The distribution of Maximal Sensorial Block (MSB) heights, presented as dermatomal levels, was, T2: 24 (12.76%) patients, T3: 143 (76.06) patients, T4: 21 (11.17%) patients. (Table I).

Intraoperative adverse events included abdominal discomfort 35 (18.61%), 28 (14.89%) Shoulder pain 51 (27.12%) Nausea/vomiting 51 (29 15.42%), hypotension 18 (9.57%) with no cases of bradycardia or respiratory complications. There were no cases of urinary retention or wound infections. Cosmetic outcomes were highly satisfactory, and all patients reported a positive operational experience at the 1-month follow-up. (Table II)

The postoperative adverse events with the most common being affecting Headache 12 (6.38%) followed by shoulder pain in 20 (10.63%) patients, and Nausea/vomiting 26 (13.82%). Notably, no cases of urinary retention were reported (0%). These findings indicate that while most adverse events were mild, nausea/vomiting and shoulder pain were more frequent,

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highlighting areas for targeted preoperative counseling and management. (Table III)

Table I Characteristics of the patients and procedure related times (n = 188)

Characteristic	Value
Age (Year)	25.5±9.25
Sex, male: Female	80:108
Body mass index (kg/m^2)	22.55±4.05
Surgery time (Min)	22.80±10.50
Total time (min)	52.10±16.20
Hospital stay (Day)	2±1
MSB, T2 :T3 :T4	24:143:21

Values are presented as mean ± standard deviation, number of patients or median (Range).

MSB, maximal sensorial block height (Dermatomal level).

Table II Intraoperative adverse events (n = 188)

Adverse event	No. (%)
Abdominal discomfort	35 (18.61)
Anxiety	28 (14.89)
Shoulder pain	51 (27.12)
Nausea/vomiting	29 15.42
Hypotension	18 (9.57)
Bradycardia	0 (0)
Respiratory discomfort/depression	0 (0)

Table III Postoperative adverse events (n = 188)

Adverse event	No. (%)
Headache	12 (6.38)
Shoulder pain	20 (10.63)
Urinary retention	0 (0)
Nausea/vomiting	26 (13.82)

DISCUSSION

In the study it reflected that the mean age of 25.5 ± 9.25 years, reflecting a young adult population with moderate age variability in Bangladesh. Similarly, another study conducted in South Africa reported a mean age of 37.9 years (Range: 13–93 years) in the non-trauma cohort, with acute appendicitis being the most common diagnosis.[13] Reflecting the various contexts of these studies, a comparative study carried out in South Africa reveals regional variations in patient demographics and medical presentations between Bangladesh and South Africa. In contrast to the South African cohort, which included an older population and more complicated surgical cases, the Bangladeshi cohort was younger, healthier and had shorter hospital stays and a lower BMI. The clinical outcomes and resource allocation strategies are impacted by regional healthcare contexts and demographic differences.

The study indicated intraoperative adverse events, including shoulder pain 27 (12%) abdominal discomfort 18 (61%) nausea/vomiting 15 (42%) anxiety 14 (89%) and hypotension 9 (57%) with no reported cases of bradycardia or respiratory complications. Postoperative issues included shoulder pain 10 (63%), nausea/vomiting 13 (82%) and headaches 6 (38%), with no instances of urinary retention or wound infections. All patients were discharged within 24 hours, with a median hospital stay of 2 days (Range 1–3). Cosmetic outcomes were highly satisfactory and all patients reported a positive operational experience during the 1-month follow-up. There was a study conducted in vietnam in the year 2010with 147 patients in three teaching hospitals, analyzed postoperative symptoms using descriptive statistics and Pearson's Product-Moment Correlation.[14] The findings identified seven symptoms occurring within three days after surgery: pain, tiredness, sleeplessness, abdominal distension, urinary retention, anxiety and dizziness. These results emphasize the need for effective management strategies to address the most problematic postoperative symptoms. The demographic parallels between Bangladesh and other Global South nations like Vietnam affect the results of surgeries. The availability of sophisticated laparoscopic equipment, qualified anesthesiologists and perioperative care facilities are only a few examples of the healthcare infrastructure constraints that both nations frequently encounter. According to our result, these limitations may result in increased rates of both intraoperative and postoperative pain.

In this study, the postoperative adverse events in Bangladesh, with nausea/vomiting 13 (82%), shoulder pain (10.63%), and headaches (6.38%) being the most common. Notably, no cases of urinary retention were reported, indicating predominantly mild adverse events. Comparatively, a study in India analyzed 634 patients with Acute Appendicitis (AA) where 418 underwent open and 216 laparoscopic appendectomies.[15] Right iliac fossa pain was the most common symptom (94.63%) and histopathological assessment revealed rates of suppurative (8.3%) and gangrenous appendicitis (2.87%). Surgical Site Infections (SSI) were reported in 23.82% of open cases but none in the laparoscopic group, highlighting the latter's lower complication rate. Postoperative durations for open and laparoscopic approaches were 4.91 ± 0.86 and 2.98 ± 0.76 days, respectively, with statistically significant differences (p = 0.04150). While open appendectomy remains effective, its higher complication rates contrast with the safer and more precise laparoscopic approach, which is increasingly favored for AA management.

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However, due to better healthcare systems, highly qualified surgical teams and technological advancements, first-world countries like the USA report far fewer problems. Among these advancements include the introduction of sophisticated laparoscopic instruments that reduce shoulder strain and diaphragmatic discomfort, such as high-definition cameras and automated insufflators.[16] Since general anesthesia eliminates the issues associated with spinal anesthesia, such as anxiety, hypotension, and inadequate muscle relaxation, it is the standard in first-world settings for laparoscopic procedures. In the USA, postoperative care has been substantially improved and postoperative problems have significantly decreased due to the widespread adoption of Enhanced Recovery After Surgery (ERAS) protocols, which prioritize early mobility, optimal pain management, and preventative measures for nausea and vomiting.[17] In addition, longer hospital stays and thorough follow-ups, including advanced imaging and laboratory diagnostics, ensure early detection and effective management of any complications, thereby contributing to better overall outcomes. Conversely, limited access to advanced laparoscopic technology and perioperative care in resource-limited settings, such as Bangladesh, increases the likelihood of complications like shoulder pain and abdominal discomfort. Moreover, resource-limited healthcare systems in countries like Bangladesh lack the capacity to implement advanced protocols like ERAS, which are standard in first-world settings. Cultural factors, such as patient anxiety and reluctance to undergo general anesthesia due to fear or traditional beliefs, further contribute to higher rates of intraoperative anxiety and discomfort. Finally, persistent investments in healthcare infrastructure, research, and training allow surgeons to use safer and more efficient procedures, resulting in improved outcomes in first-world countries. The emphasis on improved recovery methods and patient-centered care emphasizes significant disparities in outcomes between settings with ample and limited resources.

LIMITATIONS

The study was conducted in a single hospital with a small sample size. So, the results may not represent the whole community.

CONCLUSION

This study provides valuable insights with positive outcomes like brief hospital stays, pleasing cosmetic results, and few complications, this study demonstrates the effectiveness and safety of laparoscopic appendectomy in settings with limited resources. Even though common side effects like nausea and vomiting and shoulder pain were noted, they were usually mild and controllable. The importance of sophisticated technologies and healthcare infrastructure in lowering complications is highlighted by comparisons with other nations. To improve results, customized preoperative counseling, improved perioperative care, and the purchase of contemporary surgical equipment are essential. It is advised that more multicenter research be conducted with bigger sample sizes in order to confirm these results and direct clinical procedures around the world.

RECOMMENDATIONS

To reduce adverse events in laparoscopic appendicectomy, within a month, doctors should arrange follow-up appointments to assess recovery and discuss any outstanding concerns. Large-scale samples can help to improve the Laparoscopic Appendicectomy results in Bangladesh. Major complications are reduced and patient safety is ensured by using a two-stage insufflation procedure and maintaining a controlled intra-abdominal pressure. However, the problems presented by spinal anesthetic limits and diaphragmatic pain underline the importance of tailoring methods to improve outcomes.

DISCLOSURE

All the authors declared no conflict of interest.

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Original Article

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Morphometric Measurements of Upper and Lower End of Dry Human Humerus

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ABSTRACT

Background: The morphometric characteristics of the humerus are crucial in Forensic, Anatomy and Archaeology. These measurements can help forensic experts to estimate the age, sex and identity of an individual from skeletal remains. The goal of the current study was to examine various morphometric analyses of the humerus segment.

Materials and methods: From January 2021 to December 2021, this descriptive type of study was carried out in the Anatomy Department at Sylhet MAG Osmani Medical College. For the study's purpose, 200 healthy adult right humeri were gathered. Samples that met the inclusion and exclusion criteria were used for data collection. the Vertical Diameter of the Head (VDH) the Transverse Diameter of the Head (TDH) the Maximum Transverse Diameter of the head (MTD) Epicondylar Breadth (EB) Condylar Breadth (CB) Breadth of the Capitulum (BC). All the variables were checked carefully. Data were analyzed and processed in windows 10 and SPSS version 23. Data were expressed as mean±SD.

Results: The mean vertical diameter of the head of humerus was 42.28±3.43 mm, mean maximum diameter of the head of the humerus was 39.84±3.45 mm and mean transverse diameter was 39.42±6.29mm. In the lower end, the mean epicondylar breadth was 56.09±6.24 mm and mean condylar breadth was 40.42±3.35 mm.

Conclusion: For anatomists, understanding of the morphometric measurements of humerus segments is crucial. It takes forensic specialists and archaeologists to identify a skeleton's identity. Additionally, it supports the surgeons during various humerus implantation operations.

KEY WORDS
Condyle; Descriptive study; Greater tubercle; Humerus; Morphometry.

INTRODUCTION

"Morphometry" refers to the quantitative assessment of form, encompassing both size and shape. The human brachium (Arm) is defined by the humerus, the biggest bone in the upper extremity.[1] It articulates distally with the radius and ulna at the elbow joint and proximally with the glenoid cavity of scapula via the Glenohumeral (GH) joint. The head of the humerus, which connects to the glenoid cavity of the scapula in a ball and socket joint. Anatomical neck, located directly distal to the head, separates the humeral head from the greater and lesser tubercles.[2] The anatomical neck of the humerus, which separates the head of the humerus from the greater and lesser tubercles, is located immediately below the head of the humerus. The remaining epiphyseal plate forms the anatomical neck of the humerus. Proximally, a groove known as an intertubercular groove separates the two tubercles vertically. The surgical neck of the humerus follows the tubercles and is a location that frequently sustains fractures.[3] The medial and lateral epicondyles of the humerus are formed by a broadening of the bone at its distal end. The condyle, which is made up of the trochlea, capitulum, olecranon, coronoid and radial fossae, marks the distal end of the humerus.[4]

From an anatomical perspective, the humerus enables various upper limb movements. According to Celbis et al. the remnants of upper limb bones such the humerus, radius and ulna can be used to estimate life stature in the absence of lower limb bones.

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When estimating stature and bone length from the skeleton, anthropometric measures are quite helpful.[5] Estimating stature from human skeletal remains is a crucial step in determining the general body size variations and health of the target populations.[6] It also plays a crucial role in the identification of missing people during medicolegal investigations. Forensic experts and anatomists both appreciate knowing the measurements of humerus segments since it aids the investigator in determining the identity of the skeleton.[7] In order to obtain accurate anthropological information for morphometric analysis, it is crucial to employ well-preserved human skeleton bones.[8] In addition to the pelvic and cranial bone structures, radius, ulna, sternum, femur, tibia, talus and calcaneus bones are also employed in anthropological research. Bone abnormalities may be caused by chemical and mechanical influences, it is now common practice to determine sex of a dead by using strong bones like the humerus.[9] Thereby, humerus has been employed by researchers in forensic and anthropological studies extensively.[10] The morphometry of humerus are variable between different individuals with different races.[11] Anatomy, forensic medicine, anthropology, radiology, orthopedic surgery, reconstructive surgery, and sports science all benefit greatly from understanding the humerus' anatomical structure. There are differences in morphology of humerus between sexes, ethnic groupings, and geographical areas. By evaluating this information from dry bones, the data will facilitates improved diagnosis and treatment planning. Moreover, the accuracy of forensic reconstructions will be enhanced by the findings. Therefore, present study aimed to evaluate the morphometric measurements of upper and lower end of dry human humerus.

MATERIALS AND METHODS

This study was descriptive and was carried out from January 2021 to December 2021 during a period of one year. Two hundred human right humeri that were dry and totally ossified and met the inclusion criteria were obtained from the Department of Anatomy at Sylhet MAG Osmani Medical College. The Ethical Committee of Sylhet MAG Osmani Medical College, Sylhet, granted approval for the study's protocol. Exclusion criteria included humeri that were fractured or deformed. Humeri with congenital abnormalities and broken bones with healed fractures were also excluded. Data were collected using a purposive sample technique, and they were recorded on a data sheet. For measuring the humerus, an osteometric board, a digital slide caliper and a flexible ribbon tape were employed. The study variables were the Vertical Diameter of the Head (VDH) the Transverse Diameter of the Head (TDH) the Maximum Transverse Diameter of the Head (MTD) Epicondylar Breadth (EB) Condylar Breadth (CB).

The straight distance between the highest and lowest points on the articular surfaces, calculated at a right angle to the transverse diameter, was used to determine the head's Vertical Diameter (VDH). The linear distance between the most anterior and most posterior places on the articular surface of the head is used to calculate the Transverse Diameter of the Head (TDH). The straight distance between the most lateral places on the articular surface of the head was used to measure the Maximum Transverse Diameter (MTD). The transverse distance between two epicondyles was considered as Epicondylar Breadth (EB). Condylar Breadth (CB) was measured between the midpoint of the medial margin of the trochlea and the midpoint of the lateral margin of the capitulum. SPSS (Statistical Package for the Social Sciences) version 23 were used for data analysis. Data were expressed as mean±SD.

Image 1 Measurement of Vertical Diameter of Head (VDH) of right sided humerus

Image 2 Measurement of Transverse Diameter (TDH) and Maximum Transverse Diameter of Head (MTD) of right sided humerus

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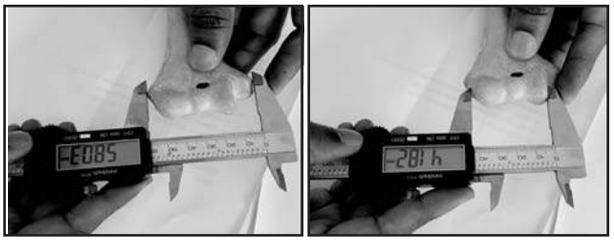

Image 3 Measurement of Epicondylar Breadth (EB) and Condylar Breadth (CB) of right sided humerus

RESULTS

Total 200 humerus were measured for the study purpose. The mean vertical diameter of the head of the 200 humerus were 42.28 ± 3.43 mm. The maximum diameter of the head of the humerus were 39.84 ± 3.45 and the transverse diameter of the head of the humerus were 39.42±6.29 (Table I).

The meanepicondylar breadth were 56.09±6.24 mm and condylar breadth were 40.42±3.35 mm (Table II).

Table I The measurements of different segments of head of the humerus (n=200)

Head of humerus	Number	Mean ± SD	Range
Vertical diameter of the head of the humerus (VDH)(mm)	200	42.28 ± 3.43	35.54-48.92
Maximum diameter of the head of the humerus (MTD)(mm)	200	39.84 ± 3.45	32-45.99
Transverse diameter of the head of the humerus (TDH)(mm)	200	39.42±6.29	32-71.73

Data was presented with mean±SD, mm-millimeter, n=total number of sample.

Table II The measurements of different segments of lower end of the humerus (n=200)

Lower end of humerus	Number	Mean±SD	Range
Epicondylar Breadth (EB)(mm)	200	56.09±6.24	39.02-68.50
Condylar Breadth (CB) (mm)	200	40.42±3.35	34.33-47.26

Data was presented with mean±SD, mm-millimeter, n=total number of sample.

DISCUSSION

Among various populations, the size of upper limb bones varies. African, American, and European populations all have humeri that are of a variable length. Asian populations vary considerably from one another. For a number of Asian groups, the discriminant value for humeral length has been determined.[12] In Forensics, Anatomy and Archeology, the morphometric characteristics of the humerus are crucial. The practitioner can use it to treat fractures of the proximal and distal humerus.[13]

The mean value of the maximum vertical diameter of the head of the humerus was 42.28±3.43 mm. Similar findings were reported in studies conducted at Turkey population, Indian population and Nepalese Population.[14,15] Sinha et al. show the maximum vertical diameter of the head of the humerus was 40.39±5.14 mm in their study.[16]

The mean value of the maximum diameter of the head of the humerus was 39.84±3.45 mm. Similar findings were reported in other study.[16] They conducted a descriptive study on 49 human dry humerus at the Department of Anatomy of Sikkim, Manipal Institute of Medical Sciences in Gangtokand, reported that the mean value of maximum diameter of the head of the humerus was 39.85±5.09 mm. Kumari et al. conducted another study comprising 80 humerii at Indira Gandhi Institute of Medical Sciences, Patna, Bihar, India reported the mean value of the maximum diameter of the head of the humerus was 43.04±5.42 mm.[17]

According to the current study, the mean value of the transverse diameter of the head of the humerus was 39.42±6.29 mm. Therefore, the findings of the study are in well agreement with the findings of the other research works.[18,19,20] A study was conducted in Multan, Pakistan, where the researchers found the maximum diameter of the humeral head were 44.95 ± 1.72 mm in male while 41.34 ± 2.07 mm in female humerus.[12] In a study done by Lokanadham et al. the maximum transverse diameter of the head of the humerus was 40.37±0.42 mm.[14] Kabakci et al. study show the mean value of transverse diameter of the head of the humerus was 38.29±3.04 mm.[19] Another study Kumari et al. reported the mean value of transverse diameter of the head of the humerus was 38.91±6.12 mm.[17]

Epicondylar breadth the mean value of Epicondylar Breadth (EB) of the right was 56.09±6.24 mm in the present study. Similar finding was reported in other studies.[15,18,] Epicondylar breadth was 59.44 ± 3.20 mm in the males and 54.52 ± 2.30 mm in the females, was observed by Khan, Gul and Nizami.[12] In a study of Desai et al. found the mean value of Medial Epicondyle to Capitulum (ME-C) of the right side was 55.50±6.61 mm.[21] Condylar breadth of the study was found 40.42±3.35 mm. Khan, Gul and Nizami, conducted a study involving 122 male humeri and 52 female humeri.[12] Condylar breadth in the male humerus ware 41.23 ± 1.91 mm and female humerus were 38.73 ± 1.76 mm.

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They also compared the result between the groups. The result was statistically significant ($p<0.05$).

CONCLUSION

The morphometric measurements of the upper and lower ends of the dry human humerus provide valuable insights into the anatomical variations across different populations, sexes and age groups. Those measurements serve as crucial tools in forensic identification, anthropological research and surgical interventions. Overall, the study of humeral morphometrics contributes to advancing knowledge in multiple scientific and medical fields, such as Anatomists, Anthropology and Forensic science for identification of skeletonwith significant implications for both research and practical applications.

DISCLOSURE

All the authors declared no competing interest.

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Original Article

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Role of Probiotic in the Management of Acute Watery Diarrhoea in Children: A Single Center Study in Bangladesh

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ABSTRACT

Background: Diarrhoeal disease in childhood accounts for a large proportion (18%) of childhood deaths, making it the second most common cause of child deaths worldwide. Probiotics have preventive as well as curative effects on several types of diarrhoea of different etiologies. The objectives of the study were to determine the role of probiotics in the management of acute watery diarrhoea in children aged less than 5 years.

Materials and methods: This prospective comparative study was carried out in the pediatrics department in TMSS (Thengamara Mohila Sabuj Sangha) Medical College and Rafatullah Community Hospital, Bogura for one year from January to December 2024. Study population was 100 children with acute diarrhoea aged 1 month to 5 years. They were divided into two groups. Fifty (50) children were included in probiotics group (Group A) and the rest fifty (50) were in without probiotics group (Group B). All the cases were assessed daily for decrease in frequency of stool and total duration of illness at discharge.

Results: Mean age at the time of admission was 17.72 ± 4.89 months for the group A and 10.37 ± 15.68 months for the group B. Frequency of stools per day at admission was 2.58 ± 0.64 with the range of 2-4 stools/day for the group A and 2.08 ± 15.68 with the range of 1-4 stools/day for the group B. Most of the cases of this study had some sign of dehydration followed by severe sign of dehydration. The mean duration of hospital stay of group A was 2.7 days and in group B 3.4 days. The mean duration of hospital stay was significantly less in group A (Probiotics group).

Conclusion: Treatment with probioticsalongside conventional therapy led to a reduction in the duration of diarrhea and a shorter hospital stay.

KEY WORDS
Acute diarrhoea; Probiotics; Hospital stay.

INTRODUCTION

Diarrhoea is a Greek word which means flowing through. Diarrhoea means the stools with increased liquidity and decreased consistency and is associated with an increased frequency of stools and an increased fecal weight. The WHO defines diarrhoea as, "3 or more watery stools on 2 or more consecutive days".[1] Diarrhoeal diseases are a major cause of morbidity and mortality around the world, especially in developing countries where children suffer the greatest brunt of infectious diarrhoea, malnutrition and death. Annually, approximately 5 million children and infants die worldwide due to diarrhoeal diseases.[2] Symptoms lasting less than 14 days represent acute diarrhoea, whereas persistent diarrhoea lasts more than 14 days but less than 4 weeks, and chronic diarrhoea is defined by a duration of symptoms greater than 4 weeks.[2]

In children, acute diarrhoea is the second most common disease after respiratory tract infection. It is caused by a variety of factors and a variety of pathogens.[3] Viruses (Mainly rotavirus) and bacteria (Pathogenic *E. coli, Salmonella, Staphylococcus aureus,* etc.) are the most common triggering factors for acute diarrhoea and are related to poor local environmental sanitation, poor personal hygiene and unsafe water supplies, other causative factors are the overuse of antibiotics resulting in bacterial intestinal disorders, allergy, inappropriate diet, poor air quality and climatic factors.[4] The disease is prevalent worldwide, especially in developing countries.[5] If acute diarrhoea in children is not treated promptly and effectively, it can lead to severe dehydration and serious sequelae, such as hemolytic uremic syndrome, Guillain-Barre syndrome, malnutrition,

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dysplasia and ultimately can be life-threatening.[4] Antibiotics are unnecessary except few cases where specific bacterial pathogens are identified, but their empirical use is not recommended in non-specific diarrhoea, contrarily unnecessary use of antibiotics may prolong the carrier state and contribute to emerging drug resistance.[6] So, probiotics role in diarrhoeal diseases have been extensively studied in the prevention and treatment of diarrhoeal diseases in pediatric populations over the past several years.[7] Normal intestinal bacteria in the human body regulate immunity and promote nutrient absorption, play an essential role in protecting the ordinary function of the intestinal barrier, but the intestinal bacteria in children with diarrhoea are in a state of imbalance and disorders of the composition of gut flora can be observed.[8]

Probiotics are a kind of active microorganisms beneficial to the host by colonizing in the human body and changing the composition of flora in specific parts of the host (such as intestine), which could promote the reproduction and growth of beneficial intestinal flora, enhancing the ability to resist external pathogenic bacteria, improving the intestinal microenvironment, and promoting increased immunity and resistance.[9] The objectives of the study were to determine the role of probiotic in the management of acute watery diarrhoea in children at TMSS Medical College and Rafatullah Community Hospital, Bogura, Bangladesh.

MATERIALS AND METHODS

This prospective comparative study was carried out in the Pediatrics Department at TMSS Medical College and Rafatullah Community Hospital, Bogura for one year from January to December 2024. Study population was 100 children with acute diarrhoea aged 1 month to 5 years during the study period. They were divided into two groups. Fifty (50) children were included in probiotics group (Group A) and the rest fifty (50) were in without probiotics group (Group B). Permission for the study was taken from the hospital director. Fully informed and voluntarily signed consents were obtained from the parents or legal guardians. Parents or guardians were given information sheets detailing the study's purpose. All the children were examined for signs of dehydration along with complete systemic examination. Rehydration and adequate nutrition were provided to both groups. Group A patients were given probiotics combination Bifidobacterium + Lactobacillus (4 billion units once daily for five days) diluted in water. Group B patients were treated without probiotics. All the cases were assessed daily for decrease in frequency of stool and total duration of illness at discharge.

The exclusion criteria were cases of diarrhoea who have received antibiotics in the last 48 hours, cases of diarrhoea having serious co-morbid conditions like cardiac, renal or respiratory disease, critically ill, intake of antidiarrhoeal drugs, bloody stool, diarrhoea more than 14 days duration and whose parents/guardians refused to give their informed consent. All the records of the study population were entered into a data collection sheet and were analyzed using SPSS v 25. Significance was calculated using independent sample t-test. Data were expressed in mean and frequency. p-value of <0.05 was considered as significant.

RESULTS

Hundred (100) children with acute diarrhoea aged 1 month to 5 years were included in the study. They were divided into two groups. Fifty (50) children were included in probiotics group (Group A) and rest fifty (50) were in without probiotics group (Group B). Mean age at the time of admission was 17.72 ± 4.89 months for the group A and 10.37 ± 15.68 months for the group B. The age distribution was not significant between the two groups (Table I). Frequency of stools per day at admission was 2.58 ± 0.64 with the range of 2-4 stools/day for the group A and 2.08 ± 15.68 with the range of 1-4 stools/day for the group B. The difference was statistically significant between the two groups (Table II).

Table I Age distribution of the study participants (n=100)

Characteristics	Group A (n=50)	Group B (n=50)	p-value
Age (Months) (Range)	17.72 ± 4.89 (4-50)	10.37 ± 15.68 (4-44)	0.383^{ns}

p-value obtained from χ^2 test. ns= non-significant.

Table II Frequency of stools per day at admission (n=100)

Characteristics	Group A (n=50)	Group B (n=50)	p-value
Frequency of stools/day	2.58 ± 0.64 (2-4)	2.08 ± 15.68 (1-4)	0.0005s

p-value obtained from χ^2 test. s= significant.

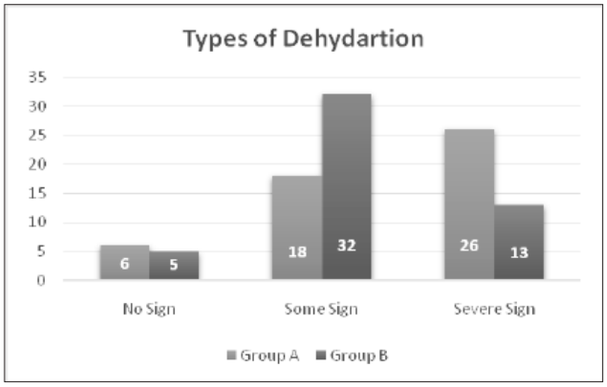

Figure 1 Types of dehydration

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In this study most of the cases had some sign of dehydration. Group A comprises 18 cases and group B comprises 32 cases followed by severe sign of dehydration (Figure 1).

Table III Duration of hospital stay (n=100)

Characteristics	Group A (n=50)	Group B (n=50)	p-value
Frequency of stools/day	2.7 ± 0.67 (2-4)	3.4 ± 0.57 (2-5)	<0.00001s

p-value obtained from χ^2 test. s= significant.

Figure 1 demonstrated that most of the cases of this study had some sign of dehydration. Group A comprises 18 cases and group B comprises 32 cases followed by severe sign of dehydration (Group A-26 cases vs group B-13 cases). Table III showed that the mean duration of hospital stay of group A was 2.7 days and in group B 3.4 days. The mean duration of hospital stay was significantly less in group A (Probiotics group).

DISCUSSION

Diarrheal disease is a global burden. It is one of the most common childhood illnesses, in both developing and developed countries.[10] This disease accounts for a large proportion (18%) of childhood deaths, making it the second most common cause of child deaths worldwide.[11] Evidence shows that diarrhea diseases disproportionately affect locations with poor access to health care, safe water, and sanitation and low-income or marginalized countries.[12]

According to the guidelines of World Health Organization (WHO) antibacterial, antiamoebic and antidiarrhoeal agents have a little role in the management of diarrhoea. WHO incorporated Oral Rehydration Solution (ORS) and zinc in the diarrhoea management guidelines thereby decreasing deaths in children by a great proportion.[13] Treatment of diarrhoea by administering living or dried bacteria to restore a disturbed intestinal microflora has a long tradition. Therapeutics of probiotics has been studied in different trials in which the beneficial use in pediatric acute diarrhoea is prominent, so European Society for Paediatric Infectious Diseases has incorporated use of probiotics in the guidelines for management of gastroenteritis in children.[14]

This study provides evidence of a significant preventive effect of a probiotic on acute diarrhoea in children aged between 1 and 5 years in a tertiary care hospital in Bangladesh. The mean age of the study cases at the time of admission was 17.72 ± 4.89 months for group A and 10.37 ± 15.68 months for group B. In a study by Bhat, et al. showed that the mean age of the child was 15.40±7.00 months in control group and 14.98±6.98 months in probiotics group.[15] Another study showed the mean age at the time of admission was 17.6±7 months for the probiotics group and 14.6±7.4 months for controls groups.[16]

The frequency of stools per day at admission was 2.58 ± 0.64 with the range of 2-4 stools/day for the group A and 2.08 ± 15.68 with the range of 1-4 stools/day for the group B. The Frequency of stools per day was 6.30±2.77 stools/day in probiotics group and 6.90±2.15 stools/day in control group in another study, another study showed the frequency of stools on first day was 14.46±0.52 stools/day in probiotics group and 12.0 ± 0.44 stools/day in control group.[15-16] Among the 100 participants of this study most of the cases had some sign of dehydration. Group A comprises 18 cases and group B comprises 32 cases followed by severe sign of dehydration was in 26 cases in group A and 13 cases in group B. In a study results showed that no sinf of dehydration was 06 cases in group A and 05 cases in group B. Besides some dehydration was 22 cases in group A and 29 cases in group B.[15]

The mean duration of hospital stay of the study cases was 2.7 days and 3.4 days in group A and B respectively. The mean duration was significantly less in group A (Probiotics group). This was consistent with the results of a study done by Billoo, et al. from Pakistan which showed that duration of diarrhea was lesser by 1.3 days in children who were treated with probiotics.[17] Shornikova and colleagues showed that the average duration was 1.7 days with probiotics, compared with 2.9 days for controls.[18] Some well-controlled clinical studies have also shown that probiotics shorten the duration of hospitalization.[16,19-21] Furthermore, no adverse events were observed in the current study.

In this study we used combined probiotics. One study suggested that the use of single probiotics has limited efficacy, while the use of combined probiotics is more helpful for the recovery of the gut microbial environment.[22]

LIMITATIONS

This study was conducted in a single center with a small sample size.

CONCLUSION

In this study, incorporation of probiotics in the treatment of acute watery diarrhoea in children emerged as effective, safe and was associated with a shorter duration of diarrhoea, leading to a faster discharge from the hospital. Probiotics might be an alternative or a complementary treatment option for acute watery diarrhoea in the paediatric population.

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RECOMMENDATIONS

Large sample size involving all age groups of children and multicenter study needs to be conducted to get better results.

DISCLOSURE

All the authors declared no conflict of interest.

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Original Article

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Efficacy and Safety of Subarachnoid Block among 8 to 14 years Old Children: A Retrospective Observational Study

Mohammad Ali[1] Fatema Johora[2*]

ABSTRACT

Background: Subarachoid Block (SAB) has been practicing as pediatric anesthesia from the very begining but still not popular in Bangladesh. There are all lots of fallacies regarding efficacy and safety of SAB in pediatric age guoup. Current study was carried out to assess the efficacy and safety of SAB among children of 8-14 years.

Materials & methods: This retrospective observational study was conducted in M A Rashid Hospital, Jamalpur from May 2023 to October 2023 by analyzing data of 32 patients (8-14 years) of ASA grading I who underwent different lower andominal and lower extremity surgeries under SAB. All the patients were evaluated following standard protocol in pre anesthetic checkup room Children were sedated with Inj. Ketamine 10 mg I/V along with Inj. Midazolam 1mg I/V. SAB was given with 25G spinocaine needle at the level of L4/L5 with 0.5% Bupivacaine hyperbaric 1.5 ml (7.5 mg) following local anesthetic (lidocaine 1% 1 ml) infiltration at the site of SAB in left lateral position. Demographic characteristics, type of surgery, duration of surgery, outcome of SAB, perioperative vital parameters (Pulse rate, systolic blood pressure, diastolic blood pressure, SPO2, ECG) characteristics of sensory and motor block, duration upto first pain complain and complication were recorded as study data by analyzing anesthesia documents and postoperative records.

Results: Mean age of the study population was 10.00 ± 2.02 years, 53.13% patients were male and all the patients were from ASA grading I. Mean operative time for surgeries was 33.59± 11.23 minutes. Circumcision (40.63%) was the commonest procedure. Success rate of SAB was 100%. Onset and duration of sensory block was 5± 2.0 minutes and 120.23± 12.34 minutes respectively. Onset of motor block could not be assessed as patients were sedated. And duration of motor block was 112.19± 12.76 minutes.Time duration for first complain of pain was 150.31± 14.64 minutes. Vital parameters of studied population were stable in perioperative period. There was not a single incidence of complication like nausea, vomiting, itching, chest pain, restlessness, shivering, urinary retention, neurological complications, Post Dural Puncture Headache (PDPH).

Conclusion: Subarachnoid block could be an effective and safe alternative for the anesthetic management of pediatric patients while performed by experienced anesthesiologist.

KEY WORDS

Complications; Children; Pediatric anesthesia; SAB; Spinal anesthesia; Subarachnoid block; Success rate.

INTRODUCTION

Spinal Anesthesia or Subarachnoid Block (SAB) the first major regional technique evolved accidentally at the end of 19th century, remains one of the most popular forms of anesthesia.[1] SAB in children was first studied by August Bier in 1899 and became popular because of its safety and efficacy compared with the practice of general anesthesia of that era.[2,3] With introduction of various skeletal muscle relaxants and inhalational anesthetics, methods of general anesthesia improved and some potential complicationsof SAB surfaced those reduced the use of SAB in children for a while.[4] In early 1980s, it was reintroduced as an alternative to General Anesthesia (GA) especially in high-risk and preterm infants.[5]

Spinal anesthesia is in common use for surgical procedures involving the lower abdomen, pelvis, perineal and lower extremities, it is beneficial for procedures below the umbilicus and for short procedures.[6,7,8] SAB could be preferred as an alternative to GA, particularly in patients with chronic respiratory disease, difficult intubation, and malignant hyperthermia.Studies found that SAB is linked withless incidence of hypotension, bradycardia, hypoxia and

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postoperative apnea in infants with higher risk of cardiovascular and respiratory instability while compared with GA.[9,10,11] A considerably large dose of local anesthetic (typically bupivacaine) is required in pediatric age group compared with adults. The duration of block is age-dependent and relatively shorter than in adults.[11,12] Various adjuvants are added with local anesthetics to prolong the duration of action.[11,13] In case of children, one important issue is whether SAB affects behavioral and cognitive function in long term and studies found no correlation between SAB and neurocognitive problems rather SAB was better in preservation of intraoperative blood pressure in children.[11,14] SAB could be a safer alternative to GA in resource constraint countries as it is cost-effective.[12,15]
Although there is positive evidence, still some controversies in practicing SAB in younger children.[11,13] The main barrier is experienced anesthesiologist is required for successful outcome of spinal anesthesia in children.[16] Recently with the advancement of regional anesthetic techniques in children along with trained personals, many healthcare facilities advocate the use of SAB not only in children where GA is contraindicated but also in most lower abdominal and lower extremity surgeries.[12,13] In Bangladesh, few studies were conducted in this aspect.[17-20] In this backdrop, current study was carried out to assess the efficacy and safety of SAB in pediatric patients.

MATERIAL AND METHODS

This study was carried out retrospectively by analyzing data of patients (Age 08-14 years old), who underwent different lower abdominal and lower extremity surgeries under SAB at M A Rashid Hospital, Jamalpur between May 2023 to October 2023. Demographic data, such as age, gender, weight, ASA (American Society of Anesthesiologists) grading, name of operations, diagnoses of patients were recorded from the preoperative anesthesia evaluation form. Patients having ASA grading I, otherwise healthy children were included in the study. Data of total 32 patients were analyzed.
All the patients were evaluated following standard protocol in pre anesthetic checkup room and written informed consent was taken from parents. They were kept fasting for 06 hours before procedure. In preoperative room, 20G intravenous (I/V) cannulation was done, followed by premedication inj. ondansetron (0.1mg/kg body weight) I/V was given. Patients were sedated with Inj. Ketamine 10 mg I/V along with Inj. Midazolam 1mg I/V. Oxygen supplementation was given through facemask. SAB was given with 25G spinocaine needle at the level of L4/L5 with 0.5% Bupivacaine hyperbaric 1.5 ml (7.5 mg) following local anesthetic (Lidocaine 1% 1 ml) infiltration at the site of SAB in left lateral position. Sensory blockade was assessed with skin prick test. As patients were sedated, onset of motor blockade could not be assessed. Patients were asked to move great toe after they were awake and time duration was recorded. Duration upto first pain complain was also recorded and Inj. pethidine 0.5 mg/kg body weight I/V was given for analgesia. Vital parameters (Pulse, SPO_2, blood pressure, temperature, ECG) were monitored in regular interval. Patients were monitored whether there was any a side effect or complication like nausea, vomiting, itching, chest pain, restlessness, shivering, urinary retention, neurological complications, Post Dural Puncture Headache (PDPH) etc.Patients were visited at OPD after 07 days of procedure and were asked about PDPH.Anesthesia documents and postoperative records were examined retrospectively, and duration of surgery, duration of motor blockade, incidence of complications were recorded as study data.

Data was compiled, presented andresults are expressed asmean ± SD and percentage.

RESULTS

Total 32 children were included in this study. Mean age of the study population was 10.00 ± 2.02 years, 53.13% patients were male and all the patients were from ASA grading I. Mean operative time for surgeries was 33.59± 11.23 minutes (Table I).

Table I Demographic data (n= 32)

Age (Year)	(Mean ± SD) 10.00 ± 2.02	
Weight (kg)	28.56 ± 4.93	
Operative time for surgeries (Minutes)	33.59± 11.23	
Gender	Frequency	Percentage (%)
Male	17	53.13%
Female	15	46.88%
ASA grading		
I	32	100.00%
II	00	0.0%
III	00	0.0%
IV	00	0.0%

Patients underwent different types of lower abdominal and orthopedic procedures, among which circumcision (40.63%) was the commonest procedure (Table II).

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Table II Types of Surgeries (n= 32)

Types of surgeries	Frequency	Percentage (%)
Circumcision	13	40.63%
Herniotomy	02	6.25%
Urethroplasty	02	6.25%
Incision and drainage of perianal abscess	02	6.25%
Incision and drainage of thigh abscess	02	6.25%
Rectal polypectomy	02	6.25%
Herniorrhaphy	01	3.13%
Cystoscopy	01	3.13%
Incision of imperforated vagina	01	3.13%
Vaginal polypectomy	01	3.13%
Examination Under Anesthesia (EUA) of vagina	01	3.13%
Curettage of osteosarcoma	01	3.13%
K-wire insertion in great toe	01	3.13%
Repair of club foot	01	3.13%
Hydrocelectomy	01	3.13%

Success rate of SAB was 100% (Figure 1). Vital parameters (heart rate, systolic blood pressure, diastolic blood pressure, SPO_2, ECG) were stable in perioperative period (Table III).

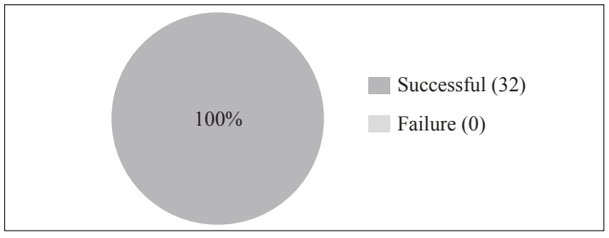

Figure 1 Outcome of SAB (n= 32)

Table III Perioperative vital parameters (n= 32)

Time	Heart rate/min (Mean ± SD)	Systolic Blood Pressure (mm Hg) (Mean ± SD)	Diastolic Blood Pressure (mm Hg) (Mean ± SD)	SPO_2(%) (Mean ± SD)	ECG
Baseline	90± 5.7	85± 6.2	50± 4.4	100±0.2	Sinus rhythm
Immediately after SAB	110± 4.9	85± 4.5	45± 5.8	100±0.4	Sinus rhythm
10 minutes after SAB	112± 6.1	80± 7.6	50± 6.7	100± 0.2	Sinus rhythm
20 minutes after SAB	112± 5.3	85± 6.6	55± 4.1	100±0.6	Sinus rhythm
30 minutes after SAB	105± 7.2	85± 5.4	60± 5.4	100±0.4	Sinus rhythm
40 minutes after SAB	107± 8.1	80± 4.7	55± 6.3	100±0.2	Sinus rhythm
50 minutes after SAB	102± 5.7	85±8.2	55± 7.2	100±0.4	Sinus rhythm
60 minutes after SAB	97± 4.8	85± 5.8	55± 5.9	100±0.2	Sinus rhythm

Table IV showed that onset and duration of sensory block was 5± 2.0 minutes and 120.23± 12.34 minutes respectively. Onset of motor block could not be assessed as patients were sedated. And duration of motor block was 112.19± 12.76 minutes. Time duration for first complain of pain was 150.31± 14.64 minutes.

Table IV Characteristics of block and first complain of pain (n= 32)

Type of block	Sensory block	Onset of block (minutes)(Mean ± SD)	5 ± 2.0
		Duration of block (Minutes) (Mean ± SD)	120.23± 12.34
	Motor block	Onset of block (Minutes) (Mean ± SD)	could not be assessed
		Duration of block (Minutes) (Mean ± SD)	112.19 ± 12.76
First complain of pain block (Minutes) (Mean ± SD)			150.31± 14.64 minutes

There was not a single incidence of complication like nausea, vomiting, itching, chest pain, restlessness, shivering, urinary retention, neurological complications, PDPH (Figure 2).

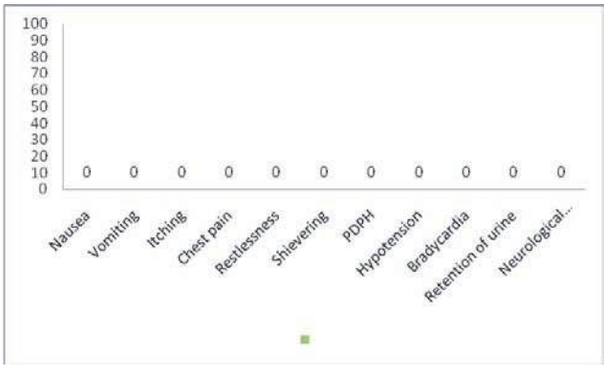

Figure 2 Complications of SAB (n= 32)

DISCUSSION

Mean age of study population was 10.00 ± 2.02 years. Previously conducted study regarding this aspect was done in more younger.[18-21]And 53.13% patients were male which was similar to previous literatures.[17-21] Circumcision (40.63%) was the commonest procedure that was concurrent with studies done by Ahmed et al. Islam et al. but other studies found inguinal hernia was more prevalent. [17-21]

Success rate of SAB was 100% in current study, and 96.1% and 97.1% success rate was observed in two related studies.[18, 21] Hyperbaric bupivacaine was used for SAB in this study. Researchers found that higher success rate of SAB when hyperbaric bupicaine is used in comparison with plain bupivacaine.[18,21,22] Children are apprehensive from the fear of parental separation, pain of surgery, and use of needles. Older children require some premedication (Midazolam, atropine, ketamine alone or in combination) for provision of sedation and anxiolysis.[23] Performing spinal puncture in a struggling, agitated child may injure delicate neurovascular structures and should be avoided. Most children require additional sedation for performing spinal infiltration and surgical procedure.[24] In this study, Inj. Ketamine 10 mg I/V along with Inj. Midazolam 1mg I/V were used for procedural sedation. Another

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fact is unique anatomical features make SAB in children challenging. Bloody tap and difficulty in aspiration are associated with failure of SAB.[13] Lumbar puncture in this age group must be performed below the 4th or 5th lumbar vertebrae (L4-L5 or L5-S1 interspace), for additional safety due to the risk of reaching the spinal cord with the needle.[25] In this study spinal block was performed either L4-L5. Technical difficulties and failure may thus be a matter ofindividual skill and experience so it was recommended to perform the spinal infiltration by experienced anesthesiologist which was done in our study.[16]

SAB in adults are frequently associated with fall of systolic blood pressure that often requires medical intervention. However, children undergoing SAB usually do not show significant hemodynamic instability because of smaller peripheral blood pool, immature sympathetic autonomic system, and compensatory reduction in vagal efferent activity.[11,12,13] In current study, no remarkable changes were observed in vital parameters in perioperative period and it was concordance with published findings.[17,18, 20, 22]

After SAB there are dense sensory and motor blockade following sympathetic blocks. Sensory block is expected to be up to T6 (Thoracic 6) level. A block above T5 is associated with several complications like hypotension. Hypotension following SAB is compensated by tachycardia in children. A pin prick test is usually used to assess sensory block. Motor block correspond with spinal nerves block of those same segment. Bromage test is used for assessment for motor block.[12,13] In this study, onset and duration of sensory block was 5± 2.0 minutes and 120.23± 12.34 minutes respectively and that was concordance with previous studies.[17,21] Onset of motor block could not be assessed as patients were sedated. And duration of motor block was 112.19± 12.76 minutes and that was similar to one study conducted in India.[21]

Complications of SAB in children are usually minor and infrequent. Hypotension anddesaturation are rare in children. If at all, it is usually dueto high block or use of sedatives. PDPH is the most common complication in children. There was not a single incidence of complication like nausea, vomiting, itching, chest pain, restlessness, shivering, urinary retention, neurological complications, PDPH in current study. Similar type of safety profile of pediatric spinal anesthesia was observed in related studies.[10.18,21]

SAB provides all components of balanced anesthesia withminimum cardiorespiratory depression and postoperative nausea, vomiting, early ambulation and rapid return of appetite. Endotracheal intubation and respiratory effects of GAcan be avoided in high-risk childrenwith limited respiratoryreserve.[11,26] The effect of SAB lasts for a couple of hours so there is less requirement for opioid analgesics.[13] In this research, duration upto first pain complain was 150.31± 14.64 minutes. It could be a cheaper alternative in countries with limitedresources, due to rapid recovery, shortened hospitalstay and more procedures performed on day care basis.[13,15,16]

CONCLUSIONS

SAB could be an essential tool for the anesthetic management of pediatric patients. Current study found it as effective and safe technique for performing lower abdominal and lower extremity surgeries among children of 8-14 years. As pediatric patients are different in their anatomy and physiology, experienced anesthesiologists should be performing SAB.

DISCLOSURE

Both the authors declared no conflict of interest.

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Review Article

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Immunoprophylaxis of Cancer Cervix

Seema Bhattacharjee[1*]

ABSTRACT

Background: Cervix is an integral part of anatomy, physiology, pathology including obstetrics and gynaecology.

Anatomical continuity, contiguity with parametrium and urology e.g. bladders base and ureter including endocrine influences on cervical mucus responsible for diagnosis of ovulation followed by pregnancy and childbirth.

Obstetrics injury, postpartum lochia, reduced cellular immunity, opportunistic infection favourable infusion and inflammation by organisms sometimes responsible for producing recurrent attack may be a probability of persistence of infection and chronic morbidity. The progress and Challenges in the development of immunopropylaxis approach for the prevention, the advantages of HPV vaccination and treatment of cervical cancer are summarised in this review article.

Methodology: This review to published studies and articles by using Google. Search strategy using appropriate key words and title.

Conclusion: Vaccinations against all HPV are available but financial issues are the prime barrier to HPV vaccination.

KEY WORDS

Cancer; Cervix; HPV; Immunity; Vaccine.

INTRODUCTION

Global challenges include rish assesment, screening, vaccine administration including mass coverage of population specially in developing countries.

Stillnow vaccine is the latest historical discovery for cancer cervix prophylaxis in the young female before coitarche, as because it is the 2nd commenest female malignancy affecting globally that provide a major health problems burden.

Discovery of immuno prophylactic vaccine against high oncogene are mainly two types e.g. quadrivalent and bivalent.

Cervical cancer is the seventh most frequent malignancy affecting worldwide. Every year almost 6,60,000 new cases are diagnosed and 3,50,000 death was recorded in 2022.[1,2]

Among the prevalent women more sufferer are detected in those areas where screening programme are inadequate or not available specially in eastern Europe, Sub Saharan Africa and south east Asia.[3]

Cancer cervix remain and important public health problem; even in Europe annual detection of 66,000 new cases and 29,000 death occur. So ratio of mortality to incidence is 55%.[4]

Peak incidence of age between 30-40 years, but decline after words but peak again during post menopausal period.[5]

Awareness regarding disease prevalence, serious consequences and prophylaxis availability should be noticeably concerned.

Disease produced by Human Papilloma Virus (HPV) mainly genital warts and cervical malignancy are protected by administration of vaccine and observed about 1 in 100 young or sexually active having genital wants in US.[6,7]

(i) Both high and low oncogene are involved.

(ii) Cancer produced by HPV beside Cervix are :

- * Anal cancer
- * Penile cancer
- * Vaginal cancer
- * Vulvar cancer

(iii) Common sites involved by HPV are mucus membrane of both male and female :

Such as :

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□	Among GI□	Genitalia
□	* Mouth□	* Vulva
□	* Throat□	* Vagina
□	* Rectum□	* Cervix
□	* Anus□	* Penis
□	□□	* Scrotum

SEARCH STRATEGY

Available studies and abstract were identified through Google Scholar (2010-2024). Key search topics were "Immunoprophylaxis of Cancer Cervix" relevant articles from references list of reviewed articles were also searched. The search term were the following key words used in combination : Cancer; Cervix; HPV; Immunity; Vaccine.

DISCUSSION

HPV is a double stranded small DNA virus having affinity to affect cutaneous and mocasa anogenital region including hands and feel. HPV affect both sexes globally invading gradually initiating skin, mucus mucus membrane and genitalia.

HPV is one of the most common STI in US. Study revealed that more than 40 types are involved during their journey from pre invasion to invasive malignancy that involve lining epithelia of cervix, vagina, vulva, penis, anus and rectum etc.

The other areas that can also affected are oropharynx, base of the tongue, tonsils, though the progression of preinvasion to invasive malignancy requires longer period even many years.

The lesion may be benign (Warts) or malignant, it has also been found that internal organs such as stomach also affected by malignancy but mechanism is not clear.

The most prevalent areas worldwide affected by cervical cancer among female population by HPV:[8-10]

* □Sub Saharan Africa : 24%
* □Eastern Europe : 14%
* □South east Asia : 14%

Researcher observational study revealed that higher prevalence of infection among :

* □Women living with HIV
* □Homosexual male
* □Co-infection with other STI
* □Person receiving immuno suppression therapy.
* □Sexually abused children.

Prevalent of male infection is highly variable that depends on sexual trends as Transgender male still having cervix.

The highest rate of involvement of cervical cancer mortality more in low and middle income countries, this is a reflexion of major inequalities probably due to lack of access to health care fascilities, including vaccination, screening programe, treatment services, social and economical determinator.

HPV infection usually clears by immunological system within 1-2 years without any longterm or lasting adverse effect.

Yearly diagnosed new cases are 660,000 and 3,50,000 death globally during the year 2022. More than 90% of cervical cancer are due to HPV infection in female.[2]

Voluntary male circumcission may also reduce the infection, using condom not only fully protected as inguinoscrotal contact may not covered by condom.

Invasion by HPV producing microabrasions and basal layer are exposed that provide an opportunity to offer a non infected individual. Primary mode of transmission by genital to genital interaction, orogenital interaction or deep kissing.

News and views of HPV infection are that it may produce life time risk almost in 85% people. Observations revealed that sexually active unvaccinated persons are affected, specially in US, about 13 million individual affected including teens but mostly may be cleared.[11]

From the affection by high oncogene HPV usually take 15-20 years to become metaplastic to precancerous and frank invasive malignancy, though may remain asymptomatic for many years during initial stage.[12]

The management cost of cervical cancer both in early and advanced stage really a burden for that particular female family, finance, future and fear of uncertainity of hope for improvement or palliation. So prophylaxis is one of important state.

HPV is a common virus having 100 types including 100 types, including various strains. Low risk strains producing warts and hands, feet and fae etc. High risk strains specially 30 variants producing malignancy involving vulva, vagina, cervix, anorectal regions and penis etc.[13]

Different types of warts are :

* Flat warts
* Planter warts
* Common warts
* Sublingual warts etc.

All warts are produced by HPV but not all forms of HPV cause warts. The strains of HPV can progress to cancer does not produce warts.

High risk strains e.g. 16, 18 initially change cervical mucosa e.g. dysplasia, if left untreated lead to CIN and later invasive malignancy.[14]

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Regardless of sex and reproductive anatomy the most important issue to prevent malignancy and its spread, so immunoprophylaxis should be duely considered.

Regarding Vaccine

Types

i. Gardasil 9V, 9V PPV
ii. Gardasil 4V, 4V HPV - both are quadrivalent
iii. Cervarix, 2V, HPV – bivalent.

All are effective against type 16, 18 that are responsible for cancer cervix.[15]

Component of Vaccine[16]

* Using recombinant DNA technology used to generate Virus Like Particular (VLP).
* Vaccines are safe and effective.
* So content are VLP but not the actual virus.
* Stimulation of immune system by the vaccine that produce antibody capable of fighting against HPV infection.
* HPU vaccine is a series of shots that are protective against HPV that often transmitted through sexual relationship.
* There are almost 40 strains of HPU, among them 80% of sexually active individual gained the infection.
* HPU vaccine is recommended for 9-45 years of age.
* So children between 11-12 years are the best candidate for vaccination.
* The most important protection provided by HPV vacination :
  (a) 90% of HPU strains that are responsible or cancer of cervix, vaginal and vulva.
  (b) 90% of HPU strains that produce genital warts.
  (c) 90% of HPV strains that produce anal and penilecaneare.
  (d) Most of the strains that are responsible for anal and throat cancer (Cancer of the back of the throat).[17]

It is the tragedy that millions of women die from cancer cervix in Bangladesh; prevented by HPV vaccination in earlier age group female starting from 10-14 years providing single dose.

It is estimated that approximately 8300 news cases of cancer cervix are diagnosed and resulting in 4900 death.[18]

HPV Vaccine for Male

One HPV vaccine Gardasil recommended for boys. Protective against getting infected from HPV types that are responsible for cancer of mouth, throat, penis and anus as well as genital warts.[19]

Importance of Vaccine

Protective against warts produced by HPV, as before administration of vaccine almost 3,40,000-3,60,000 suffered yearly. US people having 1 in 100 sexually active adult are the sufferer.[20]

Vaccine provide protection against genital strains, strains responsible for cancer of cervix vagina, vulva, penis or anus including malignancy of mouth, throat, head and neck.[21]

By building immuno modulation awareness of some strains of HPV, next dose may help to clear the infection.

CDC and FDA approved that vaccine should be administered before 1st sexual debut, the vaccine provide prophylaxis for new infection. Observation revealed that vaccines are safe and effective.

Contraindication of Vaccine

* During pregnancy
* Hypersensitivity
* Moderate to severe illness.

Adverse Effect of Vaccine

* Nausea
* Vomitting
* Headache
* Dizziness
* Soreness

Cell mediated immunity offer natural clear up of HPV; so no role of antibiotic for cure or prophylaxis.[22] Malignancy produced by HPV in male individual they are treatable if recognized during early stage.[23]
Researcher observed that in 2022, estimated 6,60,000 malignancy produced by HPV in female.[24]

Recommended Vaccine in US

* All preteens including boys and girls at the age of 11-12 years or earlier at the age of 9 years.
* Vaccine upto the age of 26 years.
* Vaccination is not recommended for every one beyond 26 years.
* Folic acid and B vitamins are crucial for DNA function including cell growth so may reduce the risk of HPV.[25]

Regarding Transmission and Global Burden of HPV

As HPV is a group of papillomavirus having highly epitheliotrophic, so productive infection are astablished within stratified squamous epithelium of the skin, anogenital and oral cavity.
As viral life cycle is linked to differentiation of the infected epithelia.[26]
HPV is the most common STI in the USA. Infection originates having vaginal, anal or oral sex with the individual already affected by the virus.

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Persistence of HPV for a longer period specially when cell mediated immunity is lowered, even take years together turn to malignancy.

Oral sex affect back of the throat e.g. oropharyngeal cancer that may involve base of the tongue and base of the tonsil.

At any age having new sex partner is a risk of developing new HPV infection; so monogamous partner is safer.

Observational study revealed that even in the US, 12,000 women develop cervical cancer and among them 4000 died due to cervical cancer even with screening and treatment.

Every year about 19,400 female and 12,000 male experience cancer by HPV.[27]

People who are taking biologics due to Inflammatory Bowel Disease (IBD) Rheumatoid Arthritis (RA) psoviasis and other autoimmune disease can also set off symptoms.

With an estimated 14 million new cases are observed annually, so it is a very common infection.[28]

HPV affect stratum basale of lowermost epidermal layer, so persistent of infection capable of hijacks the keratinocyte differentation process to continue the purpose of productive life cycle of virus.[29, 30]

Steps to Reduce HPV Infection

* To stop smoking
* To reduce stress
* Diet modification
* Search for support.

Regarding global burden of HPV noticed that

* More than 42 million US population are affected by HPV that are responsible for disease production.
* Every yearly about 13 million including teens are infected with HPV.[31]
* High risk HPV oncogene are as follows :[32] 16, 18, 31, 33, 34, 35, 39, 45, 51, 52, 56, 58, 59, 66, 68, 70.
* Some of the HR strains can attack innate immune system, so that expression of T-lymphscyte related cells are reduced.
* Impairment of important pathway involve the transcription factors e.g. Nuclear Factor Kappa B (NF-LB) Including Interferon Regulatory Factor 3 (IRE-3).[33]

National immunisation programme since 2007 introduced HPV vaccine in Australia.
Australian Immunisation Handbook recommends HPV vaccination for younter group i.e. 9-25 years including male to male homosexual persons.[34]

HPV vaccine is recommended for all children starting 8 years to 12-13 years old including high risk individual. All girls before 25 years old by NHS.[35]

In Australia almost 80% of people having HPV sometimes in their lives.[36]

In Australia, the "Therapeutics Goods Association" has approved "Gardasil 9" for use in female of 9-45 years and 9-26 years of male.[37]

Doctors recommendation for all children with 2 doses of HPV vaccine between 11-12 years of age and as early as 9 years.[38]
World Health Assembly (WHA.73.2) adopted the global strategy to accelerate the cervical cancer elimination as a public health problem with the following target along with WHO response.

* Coverage of 90% girls should be fully vaccinated with HPV vaccine by the age of 15 years.
* 70% women are screened with a high performance test by 35 years and 45 years age again.

Identification of 90% women with cervical disorder receive treatment such as : 90% of preinuasive malignancy should be treated and 90% of invasive cancer in women should be managed.

Prevention of HPV associated precancer and cancer is also a key element of WHO's. Global health sector strategy on respectively as HIV, HBV, STI 2022-2030 and the resolution WHA 74.5 (2021) on oral health includes actions on and mouth and throat Ca.[39,40,41]

Regarding incidence of cancer cervix in Nordic countries; observation revealed that screening has helped to reduce the disease, but still-now the disease remain a burden for women.

The incidence of cancer cervix is the highest in Greenland (25 per 100000) and lowest in Finland (4 per 1000000) and of variable range in other Nordic countries of variable range between 7-11 per 1,000000.

Among the Nordic countries Denmark was first introduced HPV vaccination programme followed by sweden and Iceland. Finland has recently recommended.[42]

Among the Scandinavian countries HPV vaccination program in 2008-2009 resulted in a marked decrease of HPV types disease in general population.[43]

Regarding the high risk HPV oncogene specially type 16 responsible for Oropharyngeal Squamous Cell Carcinoma (OPSCC) incidence is increasing in among middle aged (50-69 years old) individual. Male has trippled in four high income Nordic countries e.g. Denmark, Finland, Norway and Sweden over the last 30 years.

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Observation revealed that in fertile aged population during 1980's HPV 16 epidemic was the main culprit.

Administration of prophylactic HPV vaccination implementation programe in school base (both boys and girls) student gradually reduced the incidence of some OPSCC's.

The WHO campaign observered that 2-5 types high risk HPV such as 16, 31, 33 and 18, 45 are responsible for scc and adenocarcinoma respectively.

HPV 16 epidemic responsible for OPSCC's incidence in Sweden, Finland and USA (Even 10-20 years after epidemic) so current gender neutral vaccination programme that are predicted in eliminating HPV infection.

OPSCC in increasing in last 30 years specially in men of high income Nordic countries. But female are also affected. These are probably due to changes in sexual behaviour or due to persistent or sustainability of infection.

OPSCC was first observed in Stockholm region. Over the last 25 years similar changes OPSCC incidence are observed in the capitals of four Nordic countries.[44]

Incidence of HPV associated head and neck cancers are raising. So HPV vaccination lowers these incidence but with a long delay.[45]

HPV vaccines were included in child vaccination proramme in the Nordic countries between 2009-2013.[46,47]

HPV vaccine is very effective in preventing or protective against 9 types of HPV infection.[48]

During 2.10.23; the Government of Bangladesh (GOB) supported by UNICEF, vaccine Alliance (Gavi) and WHO has launched a ground breaking HPV vaccine campaign.

To protect health and future safeguard of millions of girls across Bangladesh by providing vaccine against cancer cervix.[49]

CONCLUSION

The HPV Vaccine is Crucial for public health. Vaccinations against all HPV subtypes, ie. bivalent, quadrivalent and nonavalent are available. Financial issues are the prime barrier to HPV Vaccination. The framework for behavioural and Social drivers of Vaccination, which includes practical concerns, motivation, social processes, thoughts and feelings is widely used to uncover important aspects linked with HPV Vaccination.

DISCLOSURE

The author declared no conflict of interest.

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Case Report

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A Case of Acute Flare Leading to Hepatitis B Virus Reactivation Following Discontinuation of Nucleoside Analogues

Ahsan Habib Khan[1*] Gulrukh Nawsheen Khan[2]

ABSTRACT

Background: Acute flares in chronic hepatitis B are mostly immunologic flares that often result from sudden withdrawal of the antiviral medications like Nucleoside Analogues. They can be life-threatening unless recognized and treated promptly, and there is increasing experience that preemptive antiviral treatment can diminish their occurrence and improve the clinical outcomes. The objective of this study is to report such a case, where sudden withdrawal of NAs led to Acute HBV Flare and HBV Reactivation in an Inactive HBV Carrier patient.

Case Presentation: This case report describes a 45 years old non diabetic normotensive woman presenting in the OPD of Brahmanbaria Medical College & Hospital 10 September 2022 with the complaints of yellow coloration of eyes and urine for 2 weeks and weakness, nausea, loss of appetite and low grade fever for the same duration. On examination, she was moderately icteric, had low grade fever, and there was mild tenderness in the right upper abdomen. On query, she stated that she was diagnosed as HBsAg positive four years back and after thorough evaluation, antivirals (NAs) were started. After continuing her medication regularly for the first three years, she stopped the drugs by herself, and came to us a few months later with her symptoms. She was diagnosed as a case of Acute HBV Flare leading to HBV Reactivation. Treatment was reinitiated, and she was counseled properly regarding not to stop medication by herself, and to be on regular follow up.

Conclusion: Acute HBV Flares and Hepatitis B Virus Reactivation are commonly found in patients who discontinue medication suddenly. Although most of the flares can be controlled effectively by prompt treatment, it is also not uncommon to find cases leading to hepatic failure, decompensation and death. So, all possible complications of treatment withdrawal patients should be monitored closely, and prompt treatment should be given.

KEY WORDS

Hepatitis B Virus; Flare; Reactivation; Nucleoside analogues discontinuation.

INTRODUCTION

Acute flares in chronic hepatitis B are common and may be caused by a number of identifiable and potentially treatable factors. There may be spontaneous reactivation of chronic hepatitis B or it may result from withdrawal of antiviral drugs. Flares can also result from using immunosuppressive medications like - cancer chemotherapy, antirejection drugs or corticosteroids; after antiviral therapy (Interferon and Nucleoside Analogues) HBV genotypic variation (Pre-core mutant, Core promoter mutant or HBV DNA polymerase mutant) or infections with other hepatotropic viruses (Hepatitis A, C or D virus and HIV).

The common reason for many of these exacerbation episodes is a change in the immunologic response to Hepatitis B Virus (HBV) and this may have no identifiable cause or be triggered by an increase in viral replication or genotypic change. Reactivation is frequently induced by medical treatment or treatment withdrawals. The immunologic flares that often result from sudden withdrawal of medications can be life-threatening unless recognized and treated promptly with antivirals. The experience with different nucleoside analogues used for the treatment of Hepatitis B virus mediated infection has increased our understanding of the molecular events behind hepatitis flares that occur when chronic hepatitis B is treated with drugs that potently inhibit HBV DNA polymerase.

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CASE PRESENTATION

A 45 years old non-diabetic, normotensive woman came on 10 September 2022 to the OPD of Brahmanbaria

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Medical College Hospital with the complaints of yellow coloration of eyes and urine for the last 2 weeks and weakness, nausea, loss of appetite with low grade fever for the same duration. According to her statement, she was apparently well before her symptoms arrived, then she noticed yellow coloration of her eyes and urine, which followed a prodrome like illness. She did not give any history of abdominal pain or distension of the abdomen, generalized itching, pale stool, vomiting, any nodular swelling in any part of her body, significant weight loss, or any history of taking herbal, homeopathic or ayurvedic medication over the last one year, She also complained of intermittent low grade fever, nausea, loss appetite and weakness. These were not associated with any cough, chest pain, alteration of bowel habit, dysuria, drenching night sweats or pruritus, previous TB or contact with any TB patients.

On query, she told that she was diagnosed as HBsAg positive about 4 years back, and vas evaluated thoroughly in BSMMU. After evaluation, antivirals were started, and she remained on regular follow up for the first 2.5 years, and continued medication. Her follow up investigations showed that HBV-DNA was undetected. So, after continuing antivirals for a further few months, she decided to discontinue her medication as per advice of a quack.After discontinuing medication for a few months, she developed her current symptoms, and came to us.

On examination, she was averagely built, moderately icteric, and had low grade fever (100^0F). Her BP was 100/70 mm of Hg, pulse was regular and 92/min, and the condition of her body skin was apparently normal. Examination of her abdomen revealed mild tenderness over the right hypochondriac region. Examination of all other systems were found normal.

We performed some investigations. The results were as follows :

CBC	Hb : 10.6 gm/dL, ESR : 28 mm in 1st hour, Total WBC Count : 8.80 x 10^9/L, Neutrophil 62%, Lymphocyte 30%, Platelet Count : 170 x 10^9/L
SGPT	289 U/L
SGOT	134 U/L
Bilirubin	7.7 mg/dL
Prothrombin Time	15 sec (INR : 1.25)
Alkaline Phosphatase	133 U/L
Albumin	34 gm/dL
Creatinine	0.8 mg/dL
Electrolytes	Na : 135 mmol/L, K : 4.1 mmol/L
HBeAg (ELISA)	Positive
Anti HBe Antibody (ELISA)	Negative
HBV DNA (PCR)	3.66 x 10^5IU/mL
AFP	333 ng/mL
Anti HCV (ELISA)	Negative
Anti HAV IgM	Negative
Anti HEV IgM USG of Whole Abdomen	Negative Liver normal in size having slightly coarse parenchyma. No splenomegaly. Biliary channels and Gall Bladder normal. No ascites. No lymphadenopathy.

She was diagnosed as a case of HBV Flare resulting in Reactivation of the virus. After her initial diagnosis four years back, she was put on Entecavir therapy (one tablet of 0.5 mg daily), which she discontinued after three years. So, we decided to start Tenofovir Alafenamide (One tablet of 25mg daily) along with some symptomatic medication. After thorough counseling and explanation of the disease, we advised her not to stop medication without consulting a specialist physician in future.

She was followed up weekly for the first one month, and by the end of four weeks, her Liver Function Tests became normal. After two months, USG and AFP were repeated, and found normal. After six months of continuous treatment, a complete and thorough checkup was performed and we found normal LFTs, AFP and USG, HBV DNA Undetected, HBeAg Negative and Endoscopy of Upper GIT was also normal. She is still on regular follow up, continuing her medication as advised and enjoying apparently good health.

DISCUSSION

The natural history of chronic hepatitis B is punctuated by spontaneous flares of the disease in which substantial elevation of serum aminotransferase levels occur. The acute exacerbative episodes are precipitated by reactivated infection, and it has been reported that low basal viremia increases markedly before an increase in serum aminotransferase level is appreciated.[1] In the past, these acute flares might have been mistaken for episodes of acute viral hepatitis.[2] The flares are potentially important clinically because they can have severe or even fatal consequences.[3,4] It is not uncommon to encounter episodes of abrupt elevation of Aspartate Aminotransferase (AST) and Alanine Aminotransferase (ALT) to 2 to 5 times previous levels. Less intense elevations are even more frequent if patients are monitored closely.[5]

Flares become more common during adulthood because of a breakdown of immunotolerance to HBV.[6] Some patients experience a number of symptoms such as

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fatigue, nausea and anorexia during an acute flare, but many patients, particularly those who have mild or early disease, remain asymptomatic.[7] Occasionally signs of frank liver failure will become obvious, particularly when this is superimposed on advanced chronic hepatitis B.[8]

Reactivation of HBV replication is a well-recognized complication in patients with chronic HBV infection who receive cytotoxic or immunosuppressive therapy.[9] Suppression of the normal immunological responses to HBV leads to enhanced viral replication and presumably results in widespread infection of hepatocytes.[10,11] On discontinuation of immunosuppressive medications immune competence is restored and infected hepatocytes are rapidly destroyed.[12] Theoretically, the more potent the immunosuppression, the greater the level of viral replication, and the greater the clinical consequences of sudden withdrawal.

Patients with cirrhosis are thought to have a higher risk of hepatic decompensation following a transaminase flare during a hepatitis B reactivation event, but in this case, there was no evidence of cirrhosis or portal hypertension (Although liver biopsy was not done) which suggests that all patients with hepatitis B may be at risk of this event on drug withdrawal.[13] Reported cases of transaminase flares following antiviral withdrawal occurred in patients with abnormal liver function tests and less so in those that had mild abnormalities in liver function.[2,14]

Many recent studies show that, antivirals can be safely withdrawnin those patients who develop HBeAg seroconversion during therapy.[15] In the setting of anti-hepatitis B e antigen positive chronic hepatitis B, the timing of cessation of nucleoside analogues and duration of therapy is uncertain. It is reported that among the individuals who stopped antivirals under controlled conditions and close monitoring, also developed hepatitis flares and incipient liver failure.[16] Physicians intending to treat patients with chronic hepatitis B using nucleoside analogues need to warn patients that stopping treatment may have serious consequences, particularly if patients have cirrhosis or remain HBeAg positive (Without seroconversion). Patients stopping therapy should be closely monitored for evidence of reactivation flares, and nucleoside analogues should be reinstituted before significant liver decompensation occurs.

LIMITATION

Liver biopsy was planned to see whether there is any evidence of cirrhosis or not, but could not be performed. Moreover, all investigations could not be performed due to financial constraints.

CONCLUSION

Acute flares are common in chronic hepatitis B and frequently follows after withdrawal of antiviral medication. These flares may lead to reactivation of the virus, and can be clinically serious when superimposed on established chronic viral hepatitis. To minimize the clinical impact of these acute flares, one requires an appreciation of high-risk clinical situations and prompt antiviral treatment when appropriate.

RECOMMENDATION

Regular follow-up of the patient should be advised and ensured according to schedule and all necessary investigations should be performed. Moreover, the patient should be warned never to stop medication by herself and consult with a specialist physician whenever there is any symptomatic deterioration.

DISCLOSURE

Both the authors declared no conflict of interest.

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Case Report

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Respiratory Distress in Pediatric Dengue Patients: Coinfections, Diagnosis Challenges and Treatment Strategies in an Endemic Setting

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ABSTRACT

Background: Respiratory distress complicating pediatric dengue fever cases underscores the significance of timely diagnosis and treatment, especially in endemic settings like Bangladesh. Coinfections with respiratory pathogens add to the complexity of management and treatment. This study aims to shed light on the coinfection and clinical implications of coinfections in pediatric dengue patients.

Case Presentation: We present a case report of two children with dengue fever who were diagnosed with coinfections, including Salmonella, Acinetobacter species, and Staphylococcus hominis. These patients exhibited severe clinical manifestations (Persistent fever, respiratory distress), and positive dengue serology results. Diagnostic workup revealed coinfections, highlighting the need to consider alternative pathogens in dengue patients.

Conclusion: Coinfections in dengue patients present unique challenges due to overlapping clinical features and the potential for delayed or missed diagnoses. The endemic nature of salmonella and dengue in Bangladesh increases the likelihood of co-occurrence. Understanding these associations is crucial for accurate diagnosis and timely intervention.

KEY WORDS
Bacteria; Bacteremia; Coinfection; Dengue.

INTRODUCTION

Infectious infections are a leading source of death and illness in underdeveloped countries like Bangladesh.[1,2] Many different combinations of co-infections have been documented in tropical regions.[3] Dengue fever, a virus spread by mosquitoes, has recently become a major cause of death and illness in Bangladesh The Ministry of Health and Family Welfare (MOHFW).[4] recorded 52,807 instances of dengue fever and 230 deaths from the disease between January 1 and November 20, 2022.[5]

As a result, clinicians face difficulty making a diagnosis of co-infections. Co-infections can be deadly if not treated quickly. Due to the endemic nature of both salmonella and dengue in Bangladesh, it is feasible for a child to contract both infections.[6] Again, Coagulase-negative Staphylococcus hominis infects the circulation and frequently forms biofilms on medical devices.[7] Co-infections with other infectious bacteria are also possible, albeit they are seldom recorded. Coinfections in dengue patients may occur due to the following factors:

i) the coincidence of two or more infections in countries where infectious diseases are ubiquitous

ii) the effect of the dengue virus on the immune system, which predisposes to other infections[8]

iii) pathology in some organ systems caused bydengue virus, which predisposes to superimposed infections.[9]

Here we describe a case series of dengue in two young children with coinfections with Salmonella enterica serovar enteritidis, multiple coinfections with Acinetobacter species, and Staphylococcus hominiswho developed a persistent fever, diarrhea, low platelet counts and a positive dengue serology test.

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CASE PRESENTATION-1

On September 6, 2022, a young boy, aged two years and four months, was brought to the emergency room at Ever Care Hospital in Dhaka, Bangladesh, complaining of a fever and a cough. Since September 9, 2022, he's had loose stools and vomited. On September 9, 2022, dengue NS1 was positive with thrombocytopenia of 63,000 cu mm, but dengue for IgG and IgM was negative. The patient was admitted to the hospital with a temperature of 98.7 degrees Fahrenheit, a blood pressure of 80/50 mmHg, a pulse rate of 120 beats per minute with low volume, a respiratory rate of 30 beats per minute, and a SpO2 of 100% in the room atmosphere. He also had some dehydration. When the chest was checked, there was only a vesicular breath sound. There were no signs of meningitis or brain injury. Later, he underwent a different investigation (Table I) and was diagnosed with dengue fever, Acute Respiratory Infection (ARI) and invasive diarrhea. Following admission, he received nebulization, Syp. fexofenadine, zinc oxide ointment, paracetamol, and I/V fluid bolus of normal saline and fluid for hydration, in addition to the injections of Ciprofloxacin, ondansetron and esomeprazole that were administered. A continuous 20% human albumin drip was started and lasted till the following night due to low blood pressure the following day (70/40 mmHg on September 10, 2022). Injected ceftriaxone was started on September 13, 2022, after stool C/S indicated the growth of Salmonella enteritidis (Table II). On the next day, his loose motion improved, his vital signs remained stable and he became afebrile. He was discharged from the hospital with medicine on September 14, 2022, with instructions to follow up with the Outpatient Department (OPD).

CASE PRESENTATION-2

A 6-year-old boy resident in Dhaka was admitted to Pediatric Intensive Care Unit (PICU) of Dr. Sirajul Islam Medical College and Hospital on 24 September 2022 with complaints of fever for 5 days with respiratory distress associated with abdominal pain, and a history of blackish stools. The patient was admitted to the hospital with a temperature of 101 degrees Fahrenheit, dyspnea, chest discomfort, an oxygen saturation of 85% in the room, a pulse of low volume and feeble, a heart rate of 170 beats per minute, a respiratory rate of 64 beats per minute and a blood pressure of 60/30 mmHg. Moreover, on admission, his abdomen was distended while examination. Then the diagnosis of dengue expanded syndrome was made. Ultrasonographic findings showed hepatomegaly, bilateral pleural effusions and mild ascites. Several investigations were done (Table I) such as CBC, CRP, serum electrolytes, SGPT, SGOT, D-Dimer, urine microscopy and antibiotic sensitivity test (Table II). The patient received four units of whole blood, three units of Fresh Frozen Plasma (FFP) and two units of apheresis platelets. Patient was kept Nothing by mouth (NPO) and received infusions of 5% DNS, 1% KT, 1% dopamine, 1% meropenem, 1% vancomycin, 1% ciprofloxacin and 2% human albumin. To treat pneumonia, 1% meropenem and 1% vancomycin were given. He was discharged from the hospital with the relatively stable condition on 2nd October, 2022, with medicine and instructions to follow upwith the OPD.

Table I Comparison of Investigation

Sl. No.	Test	Patient-1	Patient-2	Normal Value
01	COVID-19 Antigen Test	Negative	-	
02	Hemoglobin (Hb) (g/dL)	11.9→12.7→11.9→ 11.9→12.1→11.4	10.30→8.90→10.40→ 11.10→12→12→13.30	11-14
03	RBC count (10^12/L)	4.39→4.69→4.38→ 4.37→4.46→4.22	3.88→3.41→3.93→4.13→ 4.42→4.44→ 4.84	4.5-6.5
04	PCV (Packed Cell Volume) (%)	35.70→38.90→37.10→ 36.60→37.30→35.20	28.60→25.70→30→32.30→ 35.20→35.20→39	40-52
05	MCV (fl)	81.30→82.90→84.70→ 83.80→83.60→83.40	73.70→75.50→76.30→ 78.20→79.60→	
			79.50→ 80.60	75-87
06	MCH (pg)	27.10→27.10→27.20→ 27.20→27.10→27	26.50→26.10→26.50→ 26.90→27.10→	
			27→27.50	24-30

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Sl. No.	Test	Patient-1	Patient-2	Normal Value
07	MCHC (%)	33.30→32.60→32.10→ 32.50→32.40→32.40	36→34.60→34.70→ 34.40→34.10→ 34→34.10	31-37
08	RDW-SD (fl)	40.30→42.70→43.70→ 43.80→43.60→42.80	13.50→13.90→14.10→1 4.30→14.50→ 14.40→15.40	39-46
09	RDW-CV (%)	13.60→14.20→14→ 14.30→14.30→14	-	11.6-14
10	WBC Count (10^9/L)	2.75→5.62→6.51→ 6.30→6.60→5.69	3.2→6.4→5.8→ 6→5.8→7.6→4.4	5-15
11	Platelet Count (10^9/L)	130→125→60→110→ 150→150	300→1100→500→540→ 100→1100→740	150-400
12	Neutrophil (%)	28.30→36.80→40.90→ 36.20→31.90→37.40	43→42→29→ 24→29→32→24	20-50
13	Lymphocytes (%)	68→58.70→54.10→ 58.40→61.20→48.30	43→52→61→65→ 59→55→65	40-75
14	Monocytes (%)	3.30→4.10→0.20→4.90→ 5.00→8.30	06→04→06→ 8→9→10→09	2-8
15	Eosinophils (%)	0.40→0.20→0.20→ 0.50→1.70→6	3→2→4→3→ 3→3→2	1-6
16	Basophils (%)	0→0.20→0.20→0.00→ 0.20→0	0→0→0→0 →0→0→0	0-1
17	Absolute Neutrophil Count (10^9/L)	0.78→2.07→2.67→2.28→2.11→2.13	-	1.5-8
18	Absolute Lymphocytes Count (10^9/L)	1.87→3.30→3.52→3.68→4.04→2.75	-	6-9
19	Absolute Monocytes Count (10^9/L)	0.09→0.23→0.30→0.31→0.33→0.47	-	0.2-1
20	Absolute Eosinophils Count (10^9/L)	0.01→0.01→0.01→0.03→0.11→0.34	-	0.1-1
21	Absolute Basophils Count (10^9/L)	0→0.01→0.01→0→0.01→0	-	0.01-0.1
22	MPV (fl)	11.30→12→11.90→11.30→11.40→10.80	-	8.8-11.3
23	PCT (%)	0.08→0.08→0.02→0.09→0.09→0.10	-	0.19-0.39
24	PDW (fl)	13.40→18.30→9.30→14→16.80→14.90	-	9.3-14
25	C-Reactive Protein (CRP) (mg/dl)	<0.334	-	<0.33
	S. Electrolytes		Not Done	
26	S. Sodium (Na)- mmol/L	136	126→136→136→135→137→138→139	135-145
27	S. Potassium (k)- mmol/L	4.2	3.4→3.3→3.1→3→3.3→3.3→3.8	3.5-5
28	S. Chloride (Cl)- mmol/L	104	89→95→95→96→98→99→98	98-108
29	S. Bicarbonate (HC03) - mmol/L	22	-	24-32
30	S. Albumin (gm/dl)		2.3→4.2	3.4-5
31	S. Calcium (gm/dl)		7→7.8→7.9→8.8	8.1-10.4
32	Stool Routine Microscopy		Not Done	
	Color	Greenish	-	
	Consistency	Loose	-	
	Mucus	+	-	
	Blood	Nil	-	
	Pus Cells	Numerous	-	
	RBCs	0-2	-	
	Macrophages	Nil	-	

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Sl. No.	Test	Patient-1	Patient-2	Normal Value
	Parasites	Not found	-	
	Vegetable Cells	Nil	-	
	Yeast Cells	Nil	-	
	Fat Droplets	Nil	-	
	Epithelial Cells	Nil	-	
33	Rota Virus and Adenovirus in Stool		Not Done	
	Rota Virus	Negative	-	
	Adenovirus	Negative	-	
34	ABO and Rh typing	O Positive		
35	Aerobic C/S stool		Not Done	
	M	198	-	
36	Prothrombin Time (Seconds)	11.3	25→13	9.8-12.1
37	INR	0.94		-
38	Fibrinogen level (mg/dl)	230.7		180-350
39	APTT (Sec)	-	97→60→49→53→42	
40	S. Ferritin (ug/L)	-	>3000→>3000→939→517	24-336
41	Procalcitonin (ug/L)		25.93	0-0.05
42	SGPT (IU/L)	64	1008→485→327→272→242→204→103	7-56
43	SGOT(IU/L)	-	64→451→353→248→125	
44	D Dimer (mg/L)		>10→>10→5.15→2.11	<0.50
45	Urine RME (Physical Examination)	Not done		
	Color	-	Dark Brown	Colorless, pale yellow or straw
	Appearance	-	Strongly Turbid	Clear
	Specific Gravity	-	1.028	1.002-1.030
	Chemical Examination	-		
	Reaction	-	6	4.5-8
	Protein	-	+	Negative
	Glucose/ Sugar	-	Negative	Negative
	Ketone Bodies	-	+	Negative
	Bilirubin	-	+	Negative
	Urobilinogen		Normal	Normal/ Not increased
	Nitrate		Negative	Negative
	Leukocyte esterase		Negative	Negative
	RBC		0-1	0-2
	Pus Cells		1-3	0-5
	Epithelial Cells		0-1	0-10
46	Screening Test	Not Done		
	VDRL		Non-Reactive	
	HBsAg		Negative	
	HIV 1 & 2		Negative	
	HCV		Negative	
	MP		Negative	

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Table II Comparison of Antibiotic Sensitivity

SL No	Antibiotic	Patient-1 Salmonella ser. Enteritidis	Patient-2 Acinetobacter Species	Staphylococcus hominis
1	Ampicillin	R	-	-
2	Cefixime	R	-	-
3	Ciprofloxacin	R	R	S
4	Tetracycline	R	-	-
5	Trimethoprim / Sulfamethoxazole	R	-	-
6	Amikacin	-	R	-
7	Cefepime	-	R	-
8	Cefoperazone/ Salbactum	-	R	-
9	Ceftazidime	-	R	-
10	Ceftriaxone	-	R	R
11	Colistin	-	S	-
12	Gentamicin	-	R	S
13	Imipenem	-	I	-
14	Meropenem	-	S	-
15	Piperacillin+ Tazobactam	-	R	-
16	Tigecycline	-	S	S
17	Amoxiclav	-	-	S
18	Clindamycin	-	-	S
19	Doxycycline	-	-	S
20	Erythromycin	-	-	R
21	Levofloxacin	-	-	S
22	Linezolid	-	-	S
23	Oxacillin	-	-	R
24	Penicillin G	-	-	R
25	Rifampin	-	-	S
26	Teicoplanin	-	-	S
27	Vancomycin	-	-	S

DISCUSSION

The respiratory system can be significantly affected in dengue fever cases, especially when complicated by coinfections. In our case series, both patients exhibited respiratory distress requiring medical intervention. Respiratory symptoms in dengue fever can range from mild manifestations like cough and sore throat to severe complications such as pleural effusion and Respiratory Distress Syndrome (RDS). These respiratory complications can be exacerbated by concurrent bacterial or viral infections, as seen in our patients who presented with acute respiratory infections alongside dengue fever.One of the primary concerns with respiratory involvement in dengue cases is the potential for fluid accumulation in the lungs, leading to respiratory distress. This fluid accumulation can result from increased vascular permeability, a hallmark of severe dengue infection. Additionally, pleural effusion, as observed in Case 2, can further compromise respiratory function and necessitate aggressive management strategies.

Dengue fever epidemics occur annually in Bangladesh, a tropical nation, because of the country's high population density, unplanned urbanization, hot and humid climate, frequent rains during the monsoon season, environmental degradation and an inadequate supply of sanitation services,[10] Again, Acinetobacter is a member of the gram-negative, opportunistic coccobacilli bacterial family that is linked to a wide range of hospital-acquired infections. It is frequently transmitted to patients by remaining persistent on environmental surfaces and briefly colonizing healthcare personnel's hands.[11,12] Moreover, salmonellosis, an infection spread through contaminated food, is a serious global health problem. Mild to severe gastroenteritis, which can be fatal, can result from eating foods contaminated with Salmonella spp.[13]

Salmonella, including MDR strains, continues to be one of the primary bacterial foodborne causes of death, particularly in LMICs.[14] Recent years have seen a rise in the prevalence of multidrug-resistant Salmonella (MDR Salmonella), which includes resistance to clinically relevant antimicrobials such as fluoroquinolones and third-generation cephalosporins. Salmonella twhichis resistant to first-line antibiotics like ampicillin, chloramphenicol and trimethoprim-sulfamethoxazole is said to be resistant to multiple drugs. This has given rise to a new concern all over the world.[14] In our case 2, he was resistant to various drugs, including ampicillin, cephalosporin, Ciprofloxacin, tetracycline, and trimethoprim-sulfamethoxazole.

Staphylococcus hominis is a member of the Staphylococci genus that is gram-positive and coagulase-negative. Just like the vast majority of other coagulase-negative Staphylococci, S. hominis is known to cause a wide variety of nosocomial, or hospital-acquired, infections. It also has the potential to cause infection in patients whose immune systems are abnormally compromised.[15]

Infection with the dengue virus has been shown to co-occur with the presence of certain microorganisms. Among them were, Escherichia coli, Salmonella sp., Streptococcus pneumoniae, Mycobacterium tuberculosis, Mycoplasma pneumoniae, Shigella sonnei, Klebsiella pneumonia, Klebisellaozaenae, Enterococcus faecalis, Moraxella lacunata, Staphylococcus aureus, Rosemonas sp., Haemophilus influenza, Candida tropicalis and herpes viruses.[16] One

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possible reason for these co-infections is damage to the digestive epithelial barrier, which could be caused by endothelial damage or intestinal bleeding. This would allow pathogens from the digestive system to get into the bloodstream. In fact, intestinal flora microorganisms seem to be the most common in these cases. Also, physiopathological changes in the vascular and blood-clotting system that can be seen in some organs or systems may make infections worse. Lastly, a bacterial infection happening at the same time as a dengue virus infection could be a simple coincidence of time or, more likely, could be caused by the virus, which is thought to weaken the immune system.[17] Although co-infections of dengue and Salmonella Enteritidis and multiple coinfections with Acinetobacter species and Staphylococcus hominis have been reported in a small number of adult patients, there have been even fewer cases in children. Coinfections with bacterial pathogens, such as Salmonella enteritidis, Acinetobacter species, and Staphylococcus hominis, add another layer of complexity to respiratory management in dengue cases. These coinfections can exacerbate inflammation and compromise lung function, leading to more severe respiratory symptoms and increased mortality risk.

CONCLUSION

Rapid diagnosing respiratory distress in pediatric dengue cases with coinfections is crucial for prompt intervention. Clinicians should prioritize respiratory assessment and tailored antimicrobial therapy to improve outcomes in endemic regions like Bangladesh.

Consent

The patient's parents had written informed consent taken for publishing this case report as well as images, because of patient not adult.

DISCLOSURE

All the authors declared no competing interest.

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