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Editorial

Novel Corona Virus (COVID-2019) and Risk of Bangladesh 1
Dr. Neaz Ahmed

ORIGINAL ARTICLE

Relationship Between Iron Deficiency Anemia and Bronchiolitis in Children. 3
Farhana Karim[1], ARM Luthful Kabir[2], Mohammad Nahid Salman[3], Chanchal Kumar Mondal[4]

Role of Palmar Dermatoglyphics in Thalassemia Major Patients in Bangladesh - A Preventive Approach. 9
Afroj Zahan[1], Humaira Naushaba[2], Md. Abul Hasanat[3], Israt Jahan Tania[4], Md. Saheduzzaman[5], Tahmina akter[6]

Removal of the Laryngeal Mask Airway in Children: Deep Anaesthesia versus Awake 19
Mutasim Mehedi Masum[1], Moinul Hossain Chowdhury[2], Md. Sameul Hasan[3], Ananta Kumar Biswas[4], Swapna BiswasJoy[5], Muslema Begum[6], Md. Farhad Ur Reza[7], Mosharraf Hossain[8], Nuzhat Ara[9].

Prevention of Hypotension During Spinal Anaesthesia for Ceasarean Section: Fluid Preload Versus Ephedrine 29
Mohammad Abu Taher[1], Md. Mushfiqur Rahman[2], Mohiuddin[3], Md. Shariful Haque[4]

Morphological Study of Cusps of Right Atrioventricular Valve of Postmortem Human Heart 36
Mahmuda Sutana[1], Zakia Sultana[2], Mahmuda Khatoon[3], Md. Tazul Islam[4], Nusrath Jahan Chowdhury[5]

REVIEW ARTICLE 46
Egg Consumption and its Effects on Cardiovascular Health
Mominul Haque[1], Noor Islam[2], Motiur Rahman[3]

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Editor-in-Chief
Prof. Dr. Parimal Chandra Sarker
Prime Medical College
Pirjabad, Badargonj RoadRangpur.
E-mail : pmcrang@gmail.com

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Department of Peadiatrics
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EDITORIAL

Novel Corona Virus (COVID-2019) and Risk of Bangladesh

Dr. Neaz Ahmed

Coronaviruses are a large family of viruses that are common in many different species of animals, including camels, cattle, cats, and bats. These viruses are enveloped non-segmented positive-sense RNA viruses belonging to the family Coronaviridae and the order Nidovirales and broadly distributed in humans and other mammals[1]. Most human coronavirus infections are mild, the epidemics of the two betacoronaviruses, severe acute respiratory syndrome coronavirus (SARS-CoV)[2] and Middle East respiratory syndrome coronavirus (MERS-CoV) have caused more than 10000 cumulative cases in the past two decades, with mortality rates of 10% for SARS-CoV and 37% for MERS-CoV[3]. Much of the information's about the corona virus is still unknown.

In December, 2019, a series of pneumonia cases of unknown cause emerged in Wuhan, Hubei,China,with clinical presentations greatly resembling viral pneumonia. Deep sequencing analysis from lower respiratory tract samples indicated a novel coronavirus, which was named 2019 novel coronavirus (COVID-2019)[4]. Thus far, more than 800 confirmed cases, including in health-care workers, have been identified in Wuhan, and several exported cases have been confirmed in other provinces in China, and in Thailand, Japan, South Korea, and USA.

Much is unknown about how COVID-2019, a new coronavirus, spreads. The principal mode of transmission is still thought to be respiratory

*** Dr. Neaz ahmed**
Associate professor
Dept. of Biochemistry
Northern private Medical college, Rangpur

Current knowledge is largely based on what is known about similar coronaviruses. droplets, which may travel up to six feet from someone who is sneezing or coughing. close contact with an infectious person, such as shaking hands, or touching a doorknob, tabletop or other surfaces touched by an infectious person, and then touching your nose, eyes, or mouth can also transmit the virus.

An incubation period is the time between catching an illness and showing symptoms of the illness. Current estimates suggest that symptoms of COVID-19 usually appear within around five days or less in most cases, but the range could be between one and 14 days.[5]

Human corona viruses can remain infectious on inanimate surfaces at room temperature for up to 9 days. At a temperature of 30°C [86°F] or more, the duration of persistence is shorter. Veterinary corona viruses have been shown to persist even longer for 28 days[6].

Epidemic outbreak of COVID-19 is now a global threat for human population including Bangladesh and all the countries of the world including Bangladesh is in tremendous risk for the entry and spread of COVID-19[5,6]. Prevention of entry and spread of COVID-19 in any country including Bangladesh is now a great challenge not only for WHO but also for the concerned peoples of Bangladesh. On the basis of information regarding the COVID-19 it is evident that the virus can spread from person to person by air borne droplet, direct contact such as shaking hand with a infected person, by touching contaminated materials used by infected person and also transmission is possible through fecal contamination. It is

also important to note that highest range of virus travel via air droplet is 06 feet[5,6].

The control of entry and spread the Novel Corona Virus COVID-2019 is very important to prevent massive disaster throughout the world including Bangladesh without creating a panic. For the prevention of entry and prevention of spread of 2019-nCoV few steps must be taken.

- Strict stoppage of travelling to China.
- Creation of a quarantine hospital with highest level of security.
- At least 20 days quarantine period should be fixed for the persons who will enter the Bangladesh from China.
- Approach the suspected person from behind with strict precautions.
- If the approach to suspected person is needed from the front then should not cross the 06 feet boundary.
- Incineration of the cloths and other materials used by the isolated person.
- Isolation and incineration of the fecal matter and urine of suspected person with strict precaution.
- Quarantine area should be dry and maintenance of the temperature above 30^0C.
- Strict prohibition of animals and birds in the surroundings of the quarantine area.

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Original article

Relationship Between Iron Deficiency Anemia and Bronchiolitis in Children.

Farhana Karim[1], ARM Luthful Kabir[2], Mohammad Nahid Salman[3], Chanchal Kumar Mondal[4].

ABSTRACT

BACKGROUND: *Bronchiolitis is a major cause of death in less than five years of age throughout the world. It is the inflammatory disease of the smallest airways (bronchioles) and the leading cause of respiratory distress of small children. And anemia is the commonest co-factor in pediatric patients seeking medical advice especially in developing countries. Therefore, the anemic children are may be more susceptible to bronchiolitis.* ***OBJECTIVES:*** *To explore the association between anemia and bronchiolitis.* ***METHODS:*** *This case control study was conducted in the Department of Pediatrics, Sir Salimullah Medical College & Mitford Hospital, Dhaka from September 2011 to August 2012. Total 92 subjects aged 1- 24 months were selected for the study. Among them 42 children were with preceding or existing runny nose, cough, breathing difficulty, chest indrawing and ronchi on auscultation. And 50 age, sex, height, weight & BMI matched children not suffering from lower respiratory tract infection and having only minor illness were selected as control from OPD patients. Serum iron and iron binding capacity were done in all children. For statistical analysis Chi-square test and other tests were performed by computer-based software SPSS-16.0 version for windows.* ***RESULTS:*** *The mean serum iron and The TIBC were significantly ($p<0.05$) differed between two groups.* ***CONCLUSION:*** *From the result of this study it can be concluded that low serum iron and higher TIBC were associated in children with bronchiolitis.*

KEY WORDS: Bronchiolitis, Lower respiratory tract infection (LRTI), Iron deficiency anemia (IDA), Total iron binding capacity (TIBC).

INTRODUCTION

Bronchiolitis remains a major public health problem throughout the world exerting significant morbidity and mortality[1]. There has been an outbreak of bronchiolitis in Bangladesh in the year of 2001-2002[2] and the high prevalence of ARI has been continued since then (DGHS 2005). Bronchiolitis is the inflammatory disease of the smallest airway (bronchioles) and is the leading cause of respiratory distress of small children. The cause of bronchiolitis is mostly respiratory syncytial virus (RSV)[3]. Anemia is a major nutritional global problem of immense public health significance, affecting persons of all ages, sexes and ethnic groups. It is ranked as the commonest chronic malady of mankind affecting approximately 30% i.e. 1500 million people all over the world[4]. Acute lower respiratory tract infection (ALRTI) is a leading

AUTHOR'S AFFILIATIONS
1. Dr. Farhana Karim*
Associate Professor (cc)
Department of Pediatrics
Ad-din Akij Medical College, Khulna
2. Prof. Dr. ARM Luthful Kabir
Professor of department of Pediatrics
Ad-din Womens Medical College, Dhaka
3. Dr. Mohammad Nahid Salman
Assistant Professor
Department of Physiology
Ad-din Akij Medical College, Khulna
4. Dr. Chanchal Kumar Mondal
Associate Professor & Head
Department of Peadiatrics
Prime Medical College, Rangpur.
***For Correspondence**

cause of mortality in children below 5 years of age in developing countries[5]. According to a study, anemic children were 5.75 times more susceptible to LRTI[6]. Reduced hemoglobin level due to whatever etiology was a significant risk factor for developing ALRTI. Reduced serum iron is risk factor to the development of infantile wheeze[7]. Iron deficiency anemia is associated with lot of childhood health problems like, developmental delay[8], febrile convulsion[9], respiratory distress recurrent otitis media[11], breathe holding spells[12] etc. Anemia is also associated with lower respiratory disorder like asthma[13]. There are only few studies done in our country to find out the risk factors of bronchiolitis. We also know that anemia is highly prevalent in children of our country. So, we need to know whether bronchiolitis is associated with anemia or not.

METHODS:

This case control study was conducted in the Department of Pediatrics, Sir Salimullah Medical College & Mitford Hospital, Dhaka from September 2011 to August 2012. Total 92 subjects aged 1- 24 months were selected for the study. Among them 42 children were with preceding or existing runny nose, cough, breathing difficulty, chest indrawing and ronchi on auscultation. And 50 age, sex, height, weight & BMI matched children not suffering from lower respiratory tract infection and having only minor illness were selected as control from OPD patients. Informed consent was taken from mother, father or any legal attendant of the child. Information was collected by reviewing the clinical and laboratory findings. Data was collected in a structured questionnaire pointing on family backgrounds, feeding practices and antibiotic intake. All the children (cases and control) were investigated for CBC, PBF and RBC indices. Serum iron and iron binding capacity were done in all anemic children. The cut-off point for low hemoglobin (Hb) level was 11g/dl as per WHO definition[14]. Bronchiolitis is a clinical diagnosis characterized by runny nose followed by cough and respiratory distress in a previously healthy child below 2 years of age[15]. For statistical analysis Chi-square test and other tests as applicable was performed by computer-based software SPSS-16.0 version for windows.

RESULTS:

Demographic data of all subjects are presented in Table I and Table II

All patients had low Hb% in cases and 30 in controls (Table III). The mean serum iron level was compared between two groups and it was statistically significant ($P<0.05$) between two groups. The mean TIBC was found significantly ($P<0.05$) higher in cases than the controls (Table IV). Low serum Iron level was found to be risk factor for bronchiolitis with an odds ratio of 13.81 with 95% confidence interval of 4.12 to 46.26 and the P value was significant (Table V).

Table I: Age of the studied patients (n=92)

Age (in months)	Group I (n=50)		Group II (n=42)		P value
	n	%	n	%	
1-5	20	40.0	18	42.9	0.840^{ns}
6-10	18	36.0	13	31.0	
11-15	7	14.0	6	14.3	
16-20	4	8.0	4	9.5	
□ 20	1	2.0	1	2.4	
Mean ± SD	8.16±5.56		7.9±6.52		

Data are expressed as mean ± SD.
Statistical analysis was done by unpaired t-test
n= Total number of subjects in each group.
ns= not significant

Table II: Sex of the studied patients (n=92)

Sex	Group I (n=50)		Group II (n=42)		P value
	n	%	n	%	
Male	32	63.3	26	61.9	0.835^{ns}
Female	18	36.0	16	38.1	

Statistical analysis was done by chi square test test
n= Total number of subjects in each group.
ns= not significant

Table III: Investigation findings of cases and controls (n=92)

Investigation	Group I (n=50)		Group II (n=42)		P Value
	n	%	n	%	
Hb% (gm/dl)	10.28±7.73		12.07±1.28		0.001^{s}
Low (□11 gm/dl)	50	100	30	71.4	
Normal (15±2)	0	0.0	12	28.6	
Mean ± SD	9.0±0.93		12.0±1.4		

Data are expressed as mean ± SD.
Statistical analysis was done by chi square test test
n= Total number of subjects in each group.
s=significant

Table IV: Serum iron status of cases and controls (n=80)

Investigation	Group I (n=50)	Group II (n=42)	P value
	Mean ± SD	Mean ± S D	
Serum Iron (µg/dl)	35.07±18.94	46.38±21.04	0.001[s]
TIBC (µg/dl)	371.77±85.6	329.88±76.76	0.030[s]

Data are expressed as mean ± SD.
Statistical analysis was done by unpaired t-test.
n= Total number of subjects in each group.
s=significant; ns=not significant

Table V: Multivariate Logistic Regression Analysis Showing the Risk factor of bronchiolitis (n=80)

	OR	95% CI		P value
Serum Iron	13.81	4.12	46.26	0.001[s]

OR=Odds Ratio
CI= Confidence Interval
s=significant

DISCUSSION:

This case-control study was carried out with an aim to explore the association between anemia with bronchiolitis and to estimate Hb%, serum iron & TIBC level in children with bronchiolitis and children without bronchiolitis. In the present study it was observed that all cases and 30 controls had low Hb%. And mean Hb% was found significantly lower in cases than the controls. These findings are similar with those of some researchers[4,6,16,17]. They had found that reduced hemoglobin level due to whatever etiology was a significant risk factor for developing ALRTI. In this present study it was observed that the mean serum iron was found significantly lower and mean TIBC was found significantly higher in cases than in controls. These findings are comparable with those of some other researcher[4].

There are significant differences in serum iron and TIBC have been noted between the cases and the control in our study. This may be due to Iron deficiency is the most widespread and common nutritional disorder in developing countries[3]. Normal term infants are born with sufficient iron stores to prevent iron deficiency for the first 4-5 months of life. Thereafter, enough iron needs to be absorbed to keep pace with the needs of rapid growth. For this reason, nutritional iron deficiency is most common between 6 and 24 months of life. IDA results in impaired cognitive and motor development, repeated infections due to impaired lymphocyte and neutrophil function, short term memory impairment and poor exercise tolerance. As most of the people in our country live under the poverty line, they are encountered with various risk factors such as low birth weight, winter season, non-breast feeding, crowded environment, low socioeconomic condition, passive smoking etc.

These factors may play a vital role in developing bronchiolitis. Bronchiolitis is the commonest cause of lower respiratory tract infection in infancy. When viruses (RSV) affect the bronchioles, the disease is called bronchiolitis. Bronchiolar injury in a susceptible infant and young child can be partly a result of immunological immaturity and smaller airways due to IDA.

As this is a small study conducted over a short period time in one center it may not reflect the real picture of the whole country. Beside this, etiology of bronchiolitis like RSV and other viruses could not be isolated.

To be more conclusive the following recommendations are proposed:
- Further studies can be undertaken by including large number of patients in multiple tertiary level hospitals.
- Iron deficiency has significant association with bronchiolitis. So, it should be considered in management purpose.

CONCLUSION:

Therefore, from this study, it may be concluded that, low serum iron and higher TIBC were associated in children with bronchiolitis. Low serum Iron level was found to be risk factor for bronchiolitis with an odds ratio of 13.81.

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ORIGINAL ARTICLE

Role of Palmar Dermatoglyphics in β Thalassemia Major Patients in Bangladesh - A Preventive Approach.

Afroj Zahan[1], Humaira Naushaba[2], Md. Abul Hasanat[3], Israt Jahan Tania[4], Md. Saheduzzaman[5], Tahmina Akter[6].

ABSTRACT

CONTEXT: *Dermatoglyphics are genetically determined naturally occurring ridges on fingertips, palms, soles and toes. Many studies were carried out in various genetic diseases to determine the relationship between dermatoglyphics & genetic diseases. However, there is no published article on this topic in Bangladesh.* ***OBJECTIVES:*** *This study was aimed to establish the standard data of dermatoglyphics in Bangladeshi β thalassemia major patients and to make comparison with previous studies on other populations.* ***MATERIALS & METHODS:*** *This analytical type of cross sectional study was carried out in the department of anatomy, Sir Sallimullah Medical College, Dhaka, Bangladesh between the periods of January, 2016 to December, 2016. Fifty five β thalassemia major patients aged between 5-35 years who were considered as case group and fifty five healthy individuals of the same age & sex who were considered as control group were enrolled in this study. Dermatoglyphics of right, left & both hands were taken from both consented case group and control group who has no history of deformities and injuries of hands. These dermatoglyphics print of right, left & both hands were taken by the ink & paper method. Then dermatoglyphics of each hand were studied with magnifying glass of 4X and 6X to identify the finger ridges for determination of absolute finger ridge count (AFRC) & 'atd' angle.* ***RESULTS:*** *The mean ± SD of AFRC were higher in male case group in comparison to the male control group. The mean ± SD of atd angle is significantly higher in both sex of case as compared to control.* ***CONCLUSION:*** *We conclude that, we have observed significant increase in number of absolute finger ridge count in male β thalassemia major patients. There was significant increase of mean ±SD of atd angle in both sex of β thalassemia major patients as compared to control. The difference was highly significant (P<0.000).Our findings can be useful in the management of β thalassemia major specifically in early prediction & at the level of prevention.*

KEY WORDS: Palmar Dermatoglyphics, AFRC, 'atd' angle, β Thalassemia Major, Bangladesh.

INTRODUCTION:

Dermatoglyphics [derma-skin; glyphics-curving] is a term applied to the study of naturally occurring markings on the surface of the hands[1].The study of epidermal ridge patterns of palms & soles running parallel in small fields known as dermatoglyphics[2,3,4]. The epidermal ridges form definite local design on the distal phalanges of the digit and other sites on the palm of the hand. All the physical traits or features of the human body including dermatoglyphics are controlled genetically and passed from generation to generations governed by the law of inheritance propounded by Mendel[5]. The epidermal ridges

AUTHOR AFFILIATIONS:

1. Afroj Zahan*
   Assistant Professor, Department of Anatomy
   Gazi Medical College, Khulna.
2. Humaira Naushaba
   Professor & Head, Department of Anatomy
   Dhaka Medical College, Dhaka.
3. Md. Abul Hasanat
   Associate Professor, Department of Physiology
   Gazi Medical College, Khulna.
4. Israt Jahan Tania
   Assistant Professor, Department of Anatomy
   Ashiyan Medical College, Dhaka.
5. Md. Saheduzzaman
   Assistant Professor & Head
   Department of Microbiology, Ad-din Akij Medical College, Khulna.
6. Tahmina Akter
   Lecturer, Department of Anatomy, popular Medical College, Dhaka.

***For Correspondence**

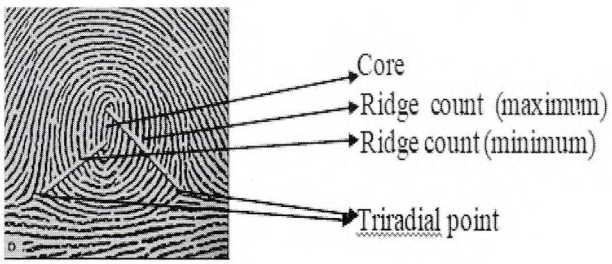
appear during foetal life and remain unchanged throughout the life until skin is damaged at the depth of 1mm[2], although the epidermal ridge configurations and their component ridges enlarge with growth, but their essential characteristics remain same throughout the life[6]. Dermatoglyphics are not distorted in superficial injuries that produce scar in the epidermis but distorted in severe Injuries like-deep burn, electric injury which produce scar in the dermis[7]. Any disturbance by the genetic or environmental factors (like-UV-rays, X-rays) can cause growth disturbance of volar pad and produce unusual or abnormal dermatoglyphics. Exogenous agents like- Rubella virus acting during or before epidermal ridge development are associated with unusual dermatoglyphics[8]. The study of dermatoglyphic has long been recognized as a valuable research tool in the field of human genetics, forensic science, medico-legal & anthropological. It has a great importance in personal identification (e.g.- passport, legal issue, assurance of attendance in offices) as the dermatoglyphic features differ from person to person and remains unchanged throughout life[5]. As the development of dermatoglyphic patterns determined genetically it constitutes the basis for examination of fingerprints in criminal investigation and medical genetics. The features of dermatoglyphics are most important in the medico-legal cases of disputes paternity. It has a very crucial role in the diagnosis of monozygotic and dizygotic twins. By comparing the frequencies of various dermatoglyphic patterns among different communities and population, it can establish ethnic position in the society[5]. Genetic, sex and racial difference may be the cause of variation of the dermatoglyphics in the normal population[9]. Abnormal chromosomes affect the development of ridge patterns, like–β thalassemia major, Down´s syndrome child have distinctive dermatoglyphic patterns on their hands and feet which have diagnostic value[10]. The thalassemias are a heterogeneous group of disorders caused by gene mutation. In thalassemia there is a genetically determined reduction in the rate of synthesis of one or more types of normal globin polypeptide chain. Haemoglobin is a conjugated protein composed of heam and globin polypeptide chain. Depending on disruption of globin polypeptide chain production, thalassemia may be classified into α, β, δ and others types. β thalassemia is most common among all types of thalassemia[11] with sever adverse consequences. The affected children are normal at birth. There is onset of anemia at about 3 months of age. Then the physical growth is retarded. There occurs hepatomegaly and splenomegaly and characteristic bone changes and mongoloid features set in[12]. Thalassaemia and the haemoglobin disorder are the most common clinically serious single gene disorder in the world. About 60,000-70,000 children are born each year with severe form of thalassaemia. Majority are born in countries with limited resources where priority tends to be given to tackling high rates of infant and child mortality from infection diseases and malnutrition[13]. In Bangladesh, more than 7000 children are born with thalassemia each year[14]. The patients suffering from beta-thalassemia major and Hb E/ beta-thalassemia do not survive for more than 5 years without repeated blood transfusion[15]. So, β thalassemia major is not only a health problem but also a socioeconomic burden.Unusual dermatoglyphics are reported in-patient with single gene disorders. As thalassemia is a single gene disorder so it too can be added to this list. Dermatoglyphic patterns in male β thalassemia major patients can be used as risk indicator. This may be used as a preliminary screening to determine those at risk of developing β thalassemia major

patients and proper monitoring can be instituted to prevent morbidity and mortality associated with this condition. Many studies were carried out in different parts of the world to determine association of dermatoglyphics with various genetically determined diseases. So far it is known that there is no published article on this topic in Bangladesh. Moreover, since racial differences have some influence on dermatoglyphics, it is necessary to find out the association of different dermatoglyphic parameters with genetically determined diseases for each population. So, the present study was designed to find out the association of different dermatoglyphic parameters in Bangladeshi β thalassemia major patients and to make comparison with those values reported by previous studies in other population.

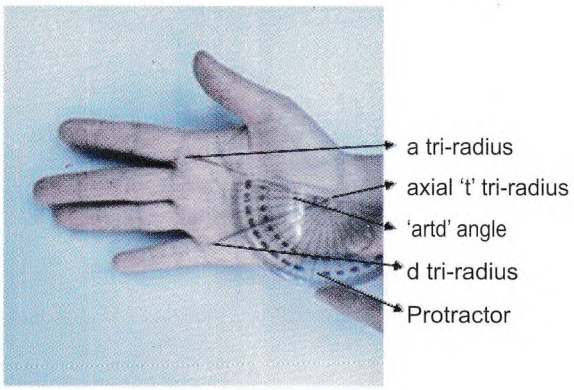
MATERIALS AND METHODS:

This study was a cross sectional analytical type of study carried out at the Department of Anatomy, Sir Salimullah Medical College, Dhaka from January 2016 to December 2016. A total of 55 consented β Thalassemia Major patients aged between 5-35 were considered as case group and 55 healthy individuals of the same age & sex were considered as control group were recruited by convenient sampling method. During selection of study population some hereditary diseases like congenital heart disease, neurological disorder, psychological disorder, asthma, pulmonary tuberculosis etc. were excluded only by history taking. Study group were selected from the transfusion medicine department (day care) of Bangabandhu Sheikh Mujib Medical University of Dhaka came from various part of Bangladesh, on the basis of Hb electrophoresis. Fingerprints of study group were collected with due permission from the chairman of the department of Transfusion Medicine of Bangabandhu Sheikh Mujib Medical University in Dhaka. The healthy individuals were selected from students of class 1 to 5 of Chairkulpuddi Govt. primary school, Madaripur and MBBS & BDS students of Sir Salimullah Medical College. Fingerprints of control were collected with due permission from the headmaster of the Chairkulpuddi Govt. primary school, Madaripur and the principal of Sir Salimullah Medical College, Dhaka. Nationality and age of the both groups were confirmed from their national identity card or birth certificate. Both groups were free from any apparent disease, injury, deformity or disorder of hand. Ethical approval for the study was obtained from the Ethical Committee of Sir Salimullah Medical College, Dhaka. After selection of the subjects, dermatoglyphic print was taken by the ink & paper method. Both hands of each individual were washed with soap before inking to remove the dirt from hands. Then the hands were wiped with a dry towel. Two white papers were fixed on clip board to take the print of both hands. Both hands were painted with ink and both hand prints were taken. Both hands of the individuals were cleaned with turpin oil and soap and wiped with towel. Then dermatoglyphics of each hand were studied with magnifying glass of 4X and 6X to identify the finger ridges for determination of AFRC & 'atd' angle. AFRC is determined by the ridges on the distal phalanges of all digits of both hands were counted from all tri-radii present. In whorl pattern as it has two tri-radii, total number of ridges from the core to both of the tri-radii were counted[16]. Process of determination of AFRC is shown in photograph1.The palm of the hand contains five tri-radii. Four tri-radii 'a', 'b', 'c', and d are found at the base of the second to fifth fingers. The fifth tri-radius is located near the base of the 4th metacarpal & is called axial 't'

tri-radius. 'atd' angle is obtained by the lines joining the 'a', 'd' & 't' tri-radius. 'atd' angle was measured with the help of a protractor in the palm. This angle was measured in right and left hand separately and noted on data sheets1. Procedure of measurement of 'atd' angle is shown in photograph 2. Data obtained from this study were checked and edited after collection. All quantitative data of study groups were compared by Student's 't' test by using a computer based program SPSS Excel version 20 (Statistical Package for Social Science). The analytic statistics of the parameters were expressed as mean ± standard deviation (SD), 95% confidence interval (CI), including minimum and maximum values.



Photograph 1: Diagrammatic representation of procedure of studying absolute finger ridges count in whorl pattern from core to the both of the triradii.



RESULTS:

The mean ± SD of AFRC of male case & control group in right hand were 64.53±28.23 (ranged from 14-139) and 44.17±22.71 (ranged from 15-94), in left hand were 72.77±28 (ranged from 14-134) and 43.50±21.99 (ranged from 6-94), in both hands were 137.30±54.97 (28-273) and 87.67±43.74 (ranged from 21-188) respectively. The mean ± SD of AFRC of female case & control group in right hand were 53.76 ± 18.59 (ranged from 15-104) and 50.23 ± 23.77 (ranged from 18-100), in left hand were 43.40 ± 16.02 (ranged from 17-87) and 47.42 ± 22.62 (ranged from 12- 90), in both hands were 102.16 ± 30.85 (ranged from 36-191) and 97.65±44.83 (ranged from 36-182) respectively.

Table I: Comparison of absolute finger ridge count of hands in case and control group.

Sex	Hand in different groups	Different groups	Absolute finger ridge count Mean ± SD (Range)	P value
Male	Right hand	Case(n=30)	64.53±28.23 (14.0-139.0)	0.005**
		Control(n=24)	44.17±22.71 (15.0-94.0)	
Female	Right hand	Case(n=25)	53.76±18.59 (15.0-104.0)	0.535^{ns}
		Control(n=31)	50.23±23.77 (18.0-100.0)	
Male	Left hand	Case(n=30)	72.77±28.83 (14.0-134.0)	0.000**
		Control(n=24)	43.50±21.99 (06.0-94.0)	
Female	Left hand	Case(n=25)	43.40±16.02 (17.0-87.0)	0.850^{ns}
		Control(n=31)	47.42±22.62 (12.0-90.0)	
Male	Both hands	Case(n=30)	137.30±54.97 (28.0-273.0)	0.001**
		Control(n=24)	87.67±43.74 (21.0-188.0)	
Female	Both hands	Case(n=25)	102.16±30.85 (36.0-191.0)	0.658^{ns}
		Control(n=31)	97.65±44.83 (36.0-182.0)	

Figure in parentheses indicate range. Comparison between study groups done by unpaired students 't' test, **= significant at P value < 0.01, ns = not significant.
Case: Thalassemia major patients &
Control: Healthy individuals

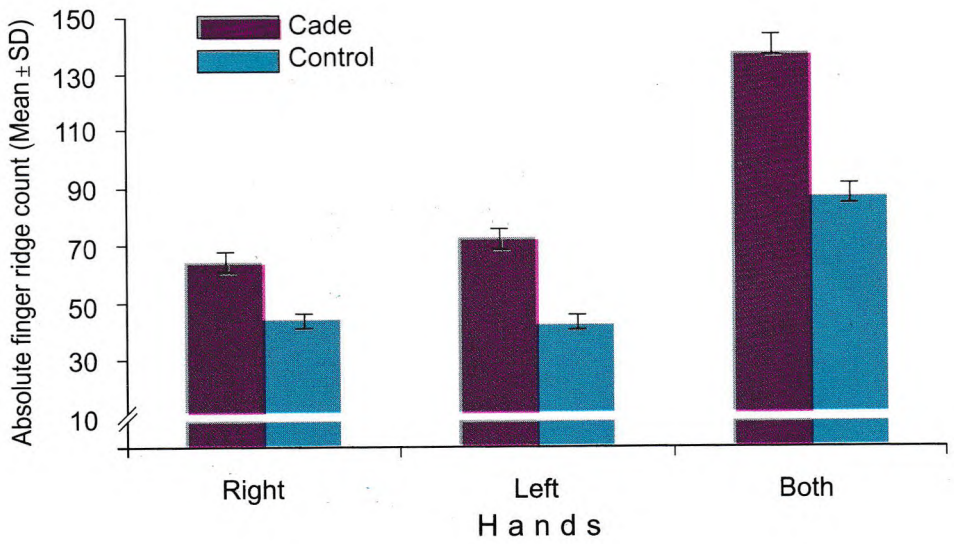


Fig 1.1a: Distribution of absolute finger ridge count of right, left & both hands of male case and control group.

Case: β Thalassemia major patients.

Control: Healthy individuals.

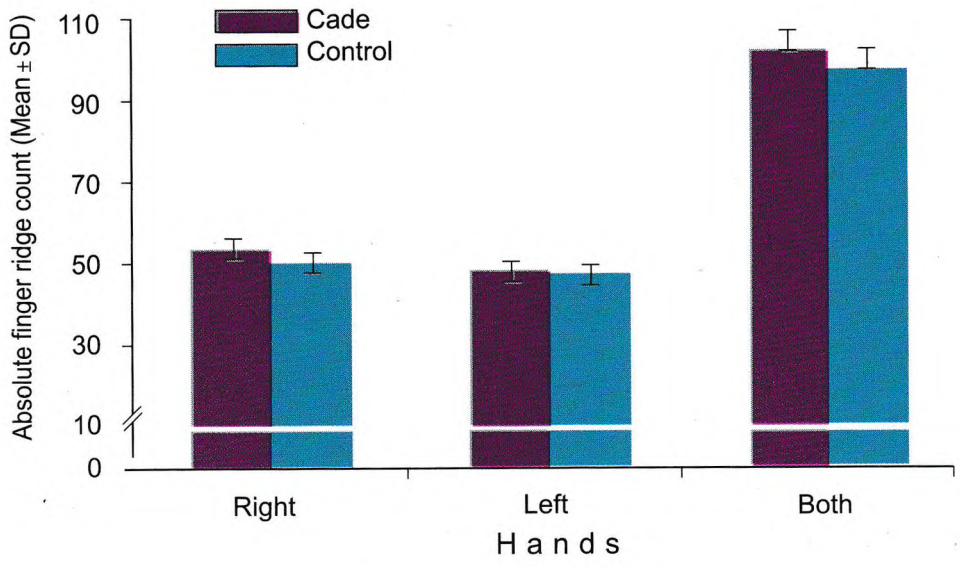


Fig 1.1b: Distribution of absolute finger ridge count of right, left & both hands of female case and control group.

Case: β Thalassemia major patients.

Control: Healthy individuals.

The mean ± SD of 'atd' angle of male case & control group in right hand were 49.80±6.13 (ranged from 41 to 65) and 38.50±2.68 (ranged from 35 to 43), in left hand were 51.77±7.21 (ranged from 41 to 66) and 38.75±3.61 (ranged from 31 to 43), in both hands were 101.56 ±12.70 (ranged from 82 to 130) and 77.25±5.68 (ranged from 67 to 86) respectively. The mean ± SD of 'atd' angle of female case & control group were in right hand 47.28±4.67 (ranged from 40 to 58) and 39.42±6.04 (ranged from 32 to 68), in left hand were 48.32±8.16 (ranged from 38 to 75) and 39.06±5.67 (ranged from 30 to 62), in both hands were 102.16 ± 30.85 (ranged from 80 to 125) and 97.65 ± 44.83 (ranged from 67 to 130) respectively.

Table II : Comparison of 'atd' angle of hands in case and control group

Sex	Hand in different groups	Different groups	Angle in degree Mean ± SD (Range)	P value
Male	Right hand	Case(n=30)	49.80±6.13 (41.0-65.0)	0.000**
		Control(n=24)	38.50±2.68 (35.0-43.0)	
Female	Right hand	Case(n=25)	47.28±4.67 (40.0-58.0)	0.000**
		Control(n=31)	39.42±6.04 (32.0-68.0)	
Male	Left hand	Case(n=30)	51.77±7.21 (41.0-66.0)	0.000**
		Control(n=24)	38.75±3.61 (31.0-43.0)	
Female	Left hand	Case(n=25)	48.32±8.16 (38.0-75.0)	0.000**
		Control(n=31)	39.06±5.67 (30.0-62.0)	
Male	Both hands	Case(n=30)	101.56±12.70 (82.0-130.0)	0.000**
		Control(n=24)	77.25±5.68 (67.0-86.0)	
Female	Both hands	Case(n=25)	95.60±11.93 (80.0-125.0)	0.000**
		Control(n=31)	78.25±11.42 (67.0-130.0)	

Figure in parentheses indicate range. Comparison between study groups done by unpaired Students 't' test, **= significant at P value <0.01, ns = not significant.
Case: (β Thalassemia major patients) Control: Healthy individuals

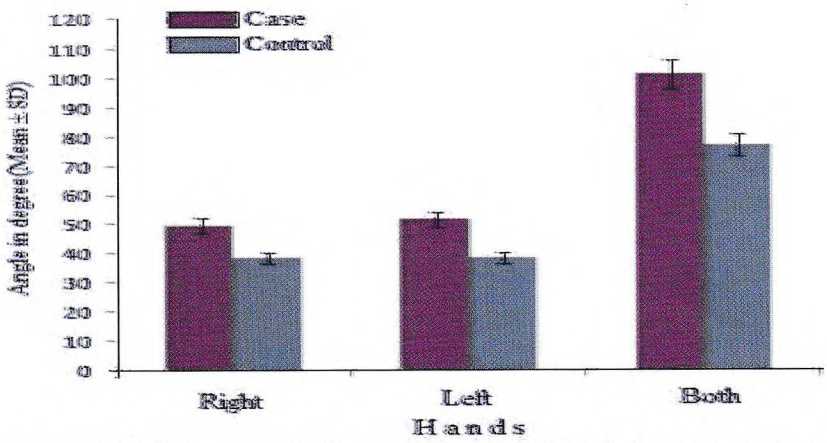


Fig 2.1 a: Distribution of 'atd' angle in right, left and both hands in case and control group in male.
Case: β Thalassemia major patients.
Control: Healthy individuals

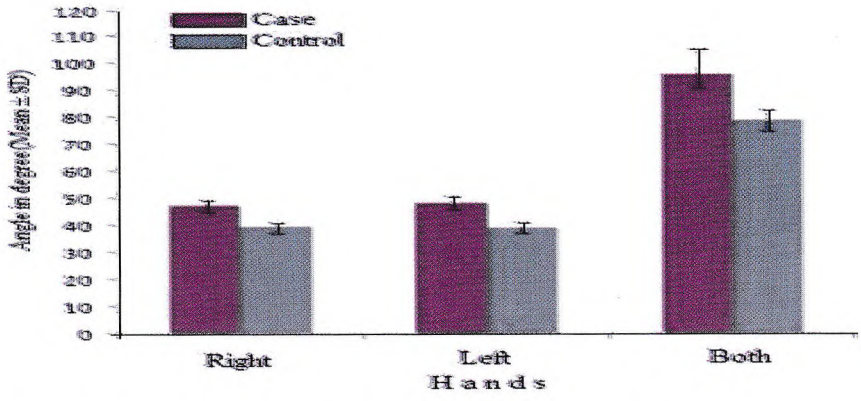


Fig 2.1 b: Distribution of 'atd' angle in right, left and both hands in case and control group in female.
Case: Thalassemia major patients.
Control: Healthy individuals

DISCUSSION

This study attempts to analyse whether any specific dermatoglyphics pattern exist for β thalassemia major patients and whether that serve as an early diagnostic tool. Comparisons of findings reported in other populations with the findings of present study have been made. Our study shows that there is significant increase of AFRC in male but no significant difference found in female β thalassemia major patients when compared with control. This observation compared with the study of Ganorkar Y. S.[17] and Dogramaci A.C.[18]. They observed that absolute finger ridge count was significantly higher in both male & female β thalassemia major patients than control group. This finding was similar with the present study in case of male but dissimilar in case of female β thalassemia major patients. Saha K.C.,

Chatterjea J.B. and Mukherjee D.P.[19] reported that AFRC were higher in female β thalassemia major patients than male patients. This finding was opposite with our study. We found significantly increased 'atd' angles in right, left & both hands of male and female β thalassemia major patients than those of control groups. The finding was similar with the findings of Rashida H.A. et. al.1, Mahato L.O. et. al.[20]. Our results also coincides with the observations of Rosner F. and Spriggs H.A.[21] who found 'atd' angle significantly larger than controls in both sexes. Dallapiccola B. et. al.[22] also observed increased 'atd' angle. Mutalimova A.B. and Kurdiumova T.I.U.[23] also observed increase of 'atd' angle in patients of β thalassemia major than controls. Saha K.C., Chatterjea J.B. and Mukherjee D.P.[19] reported that there is no deviation of 'atd' angle in β thalassemia major patients. Their findings are dissimilar with our study. Observed results of different variables showed some similarities as well as dissimilarities with the available information present on different publications. The similarities might be due to the fact that palmar dematoglyphics and β thalassemia major both are genetically determined and once established, dermatoglyphic patterns remain unchanged throughout life. Dissimilarities might be due to racial factors which are also responsible for β thalassemia major.

Further studies with larger sample size are suggested to get more precise
picture of different dermatoglyphic patterns of β thalassemia major patients
among Bangladeshi population. For further studies study subjects should be
collected from different blood transfusion centers to get the actual reflection
of dermatoglyphics parameters of β thalassemia major patients in our country. Carriers or β thalassemia minor patients should be included in the future studies. In future studies computerized automatic fingerprint reading system should be used to avoid any collection error and obtain more accurate results. Thorough laboratory investigations of study subjects are recommended to exclude the diseases which may alter dermatoglyphic patterns to make the research work more fruitful.

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Removal of the Laryngeal Mask Airway in Children: Deep Anaesthesia versus Awake

Mutasim Mehedi Masum[1], Moinul Hossain Chowdhury[2], Md. Sameul Hasan[3], Ananta Kumar Biswas[4], Swapna BiswasJoy[5], Muslema Begum[6] Md. Farhad Ur Reza[7], Mosharraf Hossain[8], Nuzhat Ara[9].

ABSTRACT:

BACKGROUND: *The laryngeal mask airway (LMA) is a safe and effective modality to maintain the airway for general anaesthesia during surgical procedures. The LMA is removed at the end of surgery, when the patient maintains an adequate respiratory rate and depth. This removal of the LMA can be done either when the patient is deep under anaesthesia (referred to as deep or early removal) or only after the patient has regained consciousness (referred to as awake or late removal). The risks of complications such as laryngospasm, lowering of oxygen saturation, coughing and salivation, etc are associated with LMA removal technique. The purpose of this prospective, randomized study was to compare the incidence of adverse events associated with removal of the LMA either in deeply anaesthetised or awake patients.* ***OBJECTIVE:*** *Compare the safety of LMA removal under Anaesthesia ("deep" group) versus removal in the awake state (awake or late group) for children scheduled for circumcision, inguinal hernia surgery under general anaesthesia.* ***SETTING & STUDY DESIGN:*** *This randomized, prospective, single-blind study was carried out in Dhaka Medical College Hospital from 8th August 2018 to 7th February 2019. Subjects/patients: Study subjects were patients with ASA grade I, II and aged 2 to 12 years undergone surgery (inguinal hernia, circumcision) under general Anaesthesia in Dhaka medical college hospital during study period. Sample were selected after careful history taking, thorough general and systemic examination and appropriate investigations fulfilling inclusion and exclusion criteria.* ***METHOD:*** *This hospital based clinical trial was conducted amongst sixty patients with above mentioned criteria. Sample was selected by purposive sampling technique. Ethical clearance for the study was obtained from the Ethical Committee, Dhaka Medical College Hospital, Dhaka. Anaesthesia was induced with halothane, oxygen and nitrous oxide followed by fentanyl 1 µgm/kg i.v. and insertion of the LMA. Any difficulties in insertion was noted. A rolled-up gauze swab served as a bite block until the LMA is removed. Anaesthesia was maintained with appropriate (50% O2 and 50% N2O) concentrations of oxygen, nitrous oxide and halothane (titrating according to depth of anaestheasia). The study subjects were allocated randomly, to have the LMA removed (and replaced with a Guedel airway) (deep group) or left in situ (awake group). In awake group, the LMA left in place until the patient fully regained consciousness. In deeply anesthetized group, the laryngeal mask was removed while the patient is still deeply anaesthetized but until spontaneous ventilation recovery. Continuous close observation was ensured of coughing, laryngospasm, airway obstruction, changes in oxygen saturation and heart rate. All the information recoded in data collection sheet.* ***RESULT:*** *In this study total of 60 patients fulfilling inclusion/exclusion criteria were studied to determine the effectiveness and safety of LMA removal under deep anaesthesia (group-D) versus removal in the awake state (Group-A) for children undergone surgery under general anaesthesia. While studying the distribution of cases by age it was found that majority of the patients i.e. 61.7% (n=37) were between 2-6 years, 38.3% (n=23) were age 7-12 years. Mean age was found to 6.0±1.3 years. It was observed that almost two third, e.g., 19(63.3%) & 18(60.0%) patients had ASA grade I in group D and group A respectively. In this study maximum patients were male (e.g., 25) and female patients were 5 (2 patients in group-D & 3 patients in group-A). In this study risk of laryngospasm was higher with awake group (26.6%) versus deep group (6.7%): risk ratio (RR) 1.23, 95% confidence interval (CI) 0.85 to 2.24. On evaluation of oxygen saturation (SPO2) value, decisive value was below 90%. More patients with oxygen saturation (deep vs awake events: 36.7% vs 13.3 %) were observed in the deep group compared to the deep group (difference of 20%). This difference was statistically significant (P=0.001). So overall findings suggested removal of the LMA under deep Anaesthesia may be safer and more successful than removal when patients are fully awake.* ***CONCLUSION:*** *Present study demonstrated that removal of the LMA under deep Anaesthesia may be safer and more successful than removal when patients are awake after surgery.*

Keywords: LMA, laryngospasm, propofol

INTRODUCTION:

During general anaesthesia there is a decrease in the tone of the pharyngeal and laryngeal muscles that maintain patency of the upper airways. Therefore, artificial devices are introduced to maintain airway patency. A patent airway is crucial for the flow of oxygen and carbon dioxide between the lungs and the atmosphere. The primary hazard of an obstructed airway is hypoxaemia, leading to impaired oxygenation of tissues. If hypoxaemia persists, reversible hypoxic damage has the potential to worsen into irreversible cell death in vital organs and becomes lifethreatening[1]. The laryngeal mask airway (LMA) is one of the most popular airway devices used to keep the airway open during Anaesthesia. The main advantages of the LMA over the endotracheal tube are its rapid and easy placement, hemodynamic stability at induction, smooth emergence from Anaesthesia, and low associated incidence of sore throat[2, 3].

A meta-analysis was performed on prospective randomised controlled trials to assess whether the laryngeal mask airway (LMA) offered any advantage over the conventional endotracheal tube in the paediatric age group. The LMA was seen to have three advantages over the tracheal tube in the form of lower incidence of cough during emergence, lower incidence of postoperative sore throat and lower incidence of postoperative vomiting ($P<0.05$). It was seen to offer no advantage over the tracheal tube in incidence of bronchospasm or laryngospasm during emergence; also, it did not offer any advantage in increasing the efficacy of the airway seal[4].

The LMA is left in situ until the patient regains protective airway reflexes unless problems arise before this time requiring active airway management[5]. At the end of general anaesthesia the device to maintain airway patency is removed as the patient emerges from unconsciousness. During emergence, the patient is prone to complications related to the airways because airway patency depends on the return of the natural tone of the pharyngeal and laryngeal muscles. This return of tone

AUTHORS AFFILIATIONS:

1. Dr. Mutasim Mehedi Masum*
   Jr. consultant, Burn& Plastic unit,
   Department of Anaesthesia, Pain, Palliative & Critical Care Medicin,
   Dhaka Medical College Hospital, Dhaka.
2. Dr. Moinul Hossain Chowdhury,
   Assistant Professor,
   Department of Anaesthesia & ICU,
   Shahid Tajuddin Ahmed Medical College,
   Gazipur.
3. Dr. Md. Sameul Hasan,
   Assistant professor,
   Department of Anaesthesia & ICU,
   Rangpur Medical College, Rangpur.
4. Dr. Ananta Kumar Biswas,
   Assistant professor,
   Faridpur Medical College, Faridpur.
5. Dr. Swapna BiswasJoy,
   Medical Officer,
   Faridpur Medical College, Faridpur.
6. Dr. Muslema Begum,
   Assistant Professor,
   Department of Anaesthesia, Pain, Palliative& Critical Care Medicine,
   Dhaka Medical College Hospital, Dhaka.
7. Dr. Md. Farhad Ur Reza,
   Anesthesiologist,
   Dhaka Medical College Hospital, Dhaka.
8. Dr. Mosharraf Hossain,
   Professor, Department of Anaesthesia,
   Dhaka National Medical College Hospital, Dhaka.
9. Dr. Nuzhat Ara,
   Assistant Professor,
   Department of Anaesthesia, Pain, Palliative& Critical Care Medicine,
   Dhaka Medical College Hospital, Dhaka.

*** For correspondence**

varies from individual to individual and is affected by the drugs used during anaesthesia. Airway-related complications of emergence include pharyngeal and laryngeal obstruction which may contribute to impaired tissue oxygenation. The risk of an adverse event is enhanced by any manipulation or intervention of the airways in light planes of anaesthesia.

The instruction manual suggests that the LMA can be safely removed when the patient has regained consciousness or protective laryngopharyngealreflexes[6]. However, some studies have reported that when the LMA is removed in patients under volatile or propofolAnaesthesia, fewer airway complications occur than when patients are awake for the removal. In this way, it is currently unclear whether the LMA should be removed at the end of the surgical procedure while the patient remains anesthetized (deep removal) or after the patient is fully awake (awake removal)[1].

The quality of evidence available in this regard is considered "low" or "very low;" therefore, well designed, randomized controlled trials are warranted to demonstrate whether early removal of the LMA after general Anaesthesia (GA) is better than late removal. Propofol is widely used during LMA insertion and provides a satisfactory effect; for instance, there is less cardiorespiratory depression when Anaesthesia is induced using propofol or targetcontrolled infusion (TCI) of propofol[2]. In addition, the choice of anesthetics during induction or maintenance of Anaesthesia may contribute to airway reactivity, which manifests during emergence from Anaesthesia.

The laryngeal mask airway (LMA) is accepted as both a rescue ventilation and a primary airway management device in both the prehospital and emergency department environments[7]. Like other devices the LMA has to be removed at the end of anaesthesia, while the patient maintains an adequate respiratory rate and depth. This is done in one of two ways: either in the deep anaesthetized state (early removal); or in the awake state (late removal)[8]. Both methods have theoretical advantages and disadvantages. The advantages of deep removal might include reduced coughing and haemodynamic disturbance. The airway must be scrupulously maintained following removal, however, because airway obstruction, arterial oxygen desaturation, coughing, retching and vomiting are possible complications. On the other hand, the advantages of removing the LMA when the patient is awake might include a lower incidence of laryngospasm and upper airway obstruction but at the potential cost of increased coughing, restlessness and biting on the LMA[9].

Although other study reported there were no significant differences in bronchospasm, larynchospasm, oxygen desaturation. Significant differences were in cough and straining, breath holding, vomiting, and finally severity of airway hyperreactivity among four subgroups. Depth of Anaesthesia didn't have any effect on incidence and severity of airway hyperreactivity but in those with propofol, they were lower than those with halothane[10]. Benumof et al[11] reported that laryngeal mask airway has two major uses, as a routine airway during general anesthesia and as a conduit for tracheal intubation. With multiple uses and multiple places of use, the laryngeal mask airway is an important option within the ASA difficult airway algorithm. More importantly, the clinical record of LMA use in "cannot ventilate, cannot intubate" situations has been excellent, and in patients whose lungs cannot be ventilated because of supraglottic obstruction and whose trachea cannot be

intubated due to unfavorable anatomy (but not periglottic pathology), the LMA should be immediately available and considered as the first treatment choice. Therefore aim of this study was to compare between groups at our setting.

Materials & Methods:

Inclusion criteria:

a) Children scheduled for routine circumcision & inguinal hernia surgery under general anaesthesia.

b) ASA physical status I, II.

c) Age 2 year to 12 yrs, both sexes.

d) Informed consent for inclusion in the study

Exclusion criteria:

a) Anaesthesia within 3 months.

b) Current or chronic upper airway disease, asthma, congenital heart disease.

Data collection procedure:

This prospective, single-blind study was conducted amongst 60 children; aged 2 years to 12 yr, undergone inguinal hernia surgery & circumcision under general anaesthesia in Dhaka medical college hospital. Approval for study was taken from ethical review committee of DMCH and written informed consent was taken from parents of each patients. Patients have H/O anaesthesia within 3 months, current or chronic upper airway disease, asthma and congenital heart disease were excluded.

Patients were allocated randomly to have the laryngeal mask airway removed either on awakening or while anaesthetized in equal number, 30 number each- group-D (deeply anaesthesized group) and group-A (awake group). Subsequent observation of respiratory factors and oxygen saturation was observed and compared between groups.

Anaesthesia was induced with halothane, oxygen and nitrous oxide (50% O2 and 50% N2O), followed by fentanyl 1 μgm/kg i.v. and insertion of the LMA. Any difficulties in insertion were noted. A rolled-up gauze swab served as a bite block until the LMA is removed. Anaesthesia was maintained with appropriate concentrations (50% O2 and 50% N2O) of oxygen, nitrous oxide and halothane (titrating according to depth of anaesthesia). Oxygen saturation maintained at or above 95.0% during operation. Paracetamol (10-15 mg/kg/dose) suppository was given when spontaneous ventilation is judged to be satisfactory.

Five minutes before the anticipated end of surgery, anaesthesia was deepened by giving the minimum alveolar concentration (MAC) of halothane (adjusted for age) with nitrous oxide. The child then allocated randomly, to have the LMA removed (and replaced with a Guedel airway) (deep group) or left in situ (awake group). In awake group, the LMA was left in place until the patient fully regained consciousness. In deeply anesthetized group, the laryngeal mask was removed while the patient is still deeply anaesthetized, but until spontaneous ventilation recovery.

Each child then turned onto the left side and transferred to the recovery room, breathing air supplemented by oxygen 4 litre/min by Hudson's face mask. A pulse oximeter probe applied to a finger of the uppermost hand and haemoglobin oxygen saturation and heart rate was displayed. Continuous close observation was ensured of coughing, laryngospasm, changes in oxygen saturation and heart rate, for 60 min from the end of anaesthesia or until the child awake (whichever was sooner). Observations and management was recorded. The LMA or Guedel airway was removed in the recovery room when the child awoke

sufficiently to swallow. All the information recorded in data collection sheet. The complications which were developed during the procedure was noted and managed accordingly. In laryngospasm 100% oxygen was given, then airway was removed and suction given, gentle CPAP with jaw thrust applied. If not improved suxamethonium was given and re-intubated. All collected information checked very carefully to identify the error in the data. Data processing work was consisted of registration schedules, editing computerization, preparation of dummy table, analyzing and matching of data.

DATA ANALYSIS:

Socio-demographic and clinical variables: Data for socio- demographic and clinical variables were obtained from all participants by the use of a pre- designed and easily understandable case record form. The socio-demographic variables studied- age, place of residence and occupation. Socioeconomic levels were determined by occupation, household's income and expenditure. All collected data checked very carefully to identify the error in the data. Data processing work consist of registration schedules, editing computerization, preparation of dummy table, analyzing and matching of data. After collection of all information, these data were checked, verified for consistency and edited for finalized result. After editing and coding, the coded data directly entered into the computer by using SPSS version 22. Data cleaning validation and analysis was performed using the SPSS software and graph and chart by MS excel.

RESULTS:

Table- I: Age distribution of the patients (n=60)

Age (years)	Number of patients		Total & Percentage	P value
	Group D n(%)	Group A n(%)		
2-6	18(60.0%)	19(63.3%)	37(61.7%)	0.371
7-12	12(40.0%)	11(36.6%)	23(38.3%)	
Mean ± S.D.	6.3±1.1	5.8±1.5	6.0±1.3	

Total of 60 patients fulfilling inclusion/exclusion criteria were studied to determine the effectiveness and safety of LMA removal under deep anaesthesia (group-D) versus removal in the awake state (Group-A) for children undergone surgery under general anaesthesia. While studying the distribution of cases by age it was found that majority of the patients i.e. 61.7% (n=37) were between 2-6 years, 38.3% (n=23) were age 7-12 years. Mean age was found to 6.0±1.3 years. The difference was not statistically significant ($p>0.05$) between two groups Table I.

Table- II: Distribution of patients according to type of surgery (n=60)

Type of surgery	Number of patients				P value
	Group D n(%)		Group A n(%)		
	n	%	n	%	
Circumcision	26	86.7	23	76.7	
Inguinal hernia	4	13.3	7	23.3	0.082

Distribution of patients according to type of surgery revealed that, circumcision surgery cases were predominant (86.7% and 76.7% in group D & A respectively). The difference was not statistically significant (p>0.05) between two groups.

Figure-1: Distribution of the study patients according to types of ASA status (n=60)

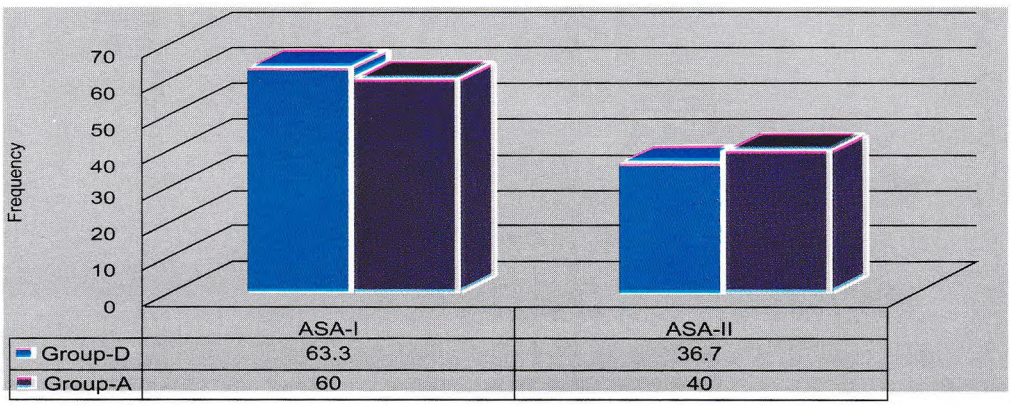


Fig.1 shows ASA status of the study patients, it was observed that almost two third, e.g., 19(63.3%) & 18(60.0%) patients had ASA grade I in group D and group A respectively. The difference was not statistically significant (p>0.05) between two groups.

Table- III: Evaluation of respiratory adverse events following LMA removal (n=60)

Respiratory adverse events	Number of patients				P value
	Group D n(%)		Group A n(%)		
	n	%	n	%	
Laryngeal spasm	2	6.7	8		0.039
Bronchospasm	0	0	0	0	0

Table III summarizes the rate of respiratory adverse events observed in both groups over the whole postoperative periods. Risk of laryngospasm was higher with awake group (26.6%) versus deep group (6.7%): risk ratio (RR) 1.23, 95% confidence interval (CI) 0.85 to 2.24.

Figure-2: Comparison of Oxygen saturation (SpO2) value between groups (n=60)

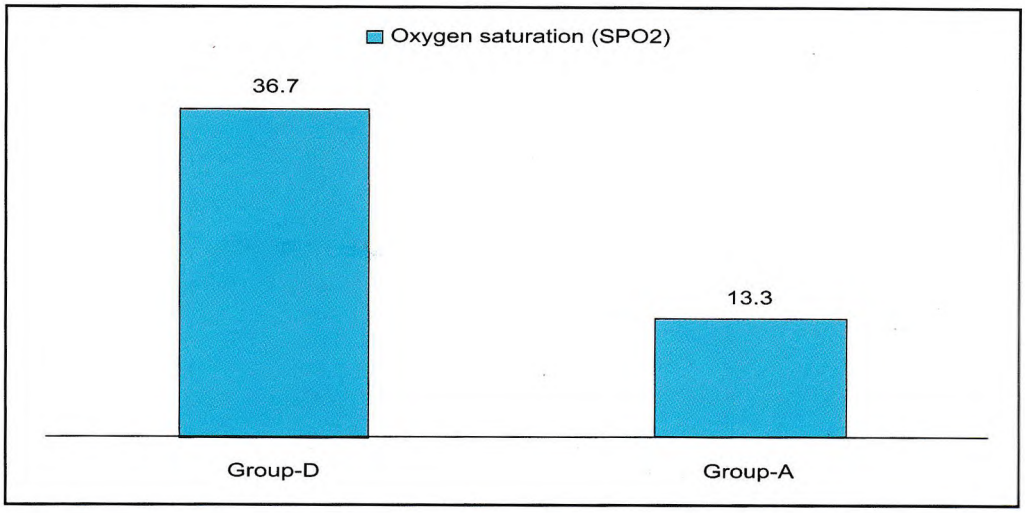


Fig.2 shows the oxygen saturation (SpO_2) value between groups. Decisive value was below 90%. The limit of 90% is chosen in line with institutional guidelines based on postanaesthesia care unit discharge criteria. More patients with oxygen saturation (deep vs awake events: 36.7% vs 13.3%) were observed in the deep group compared to the deep group (difference of 20%). This difference was statistically significant (P=0.001).

Table- IV: Assessment of airway hyperreactivity and other complications amongst the study subject (n=60)

Variables	Number of patients				P value
	Group D n(%)		Group A n(%)		
	n	%	n	%	
Coughing	3	10.0	10	33.3	0.001
Stridor	1	3.3	6	20.0	1.000

p<0.05 considered as significant
p-value reached from chi square test

Table IV: shows the other complications amongst the study subject. The risk of coughing was less after early removal (Group-D) than late removal (Group-A). Coughing in deep vsawake events were in 10.0% vs 33.3% of patients respectively: RR 0.52, 95% CI 0.29 to 0.94. The difference was statistically significant (P< 0.05). The number of participants having experience stridor was similar in both groups.

Table- V: Baseline characteristics of study population (n=60)

Characteristics with Indicator	Group D n(%)	Group A n(%)	P value
SpO_2 (below 90%)	4(13.3%)	11(36.7%)	0.037[s]
Coughing	3(10.0%)	10(33.3%)	0.029[s]
Stridor	1(3.3%)	6(20.0%)	0.045[s]

p<0.05 considered as significant
p-value reached from chi square test

Table V: Baseline characteristics were respiratory adverse events, airway hyperreactivity, etc. in this study although more respiratory adverse events were observed in the deep group compared to the awake group, this difference was statistically significant. It means effectiveness of both technique is equal. The risk of coughing and desaturation was less after early removal (group-D) than late removal (group-A) and this difference was statistically significant. So overall findings suggested removal of the LMA under deep Anaesthesia may be safer and more successful than removal when patients are fully awake.

DISCUSSION:

Patients characteristics in respect of age and others socio-demographic characteristics and ASA status were similar amongst the study population. Total of 60 patients fulfilling inclusion/exclusion criteria were studied to determine the effectiveness and safety of LMA removal under deep anaesthesia (group-D) versus removal in the awake state (Group-A) for children undergone surgery under general anaesthesia. While studying the distribution of cases by age it was found that majority of the patients i.e. 61.7% (n=37) were between 2-6 years, 38.3% (n=23) were age 7-12 years. Mean age was found to 6.0±1.3 years. It was observed that almost two third, e.g., 19(63.3%) & 18(60.0%) patients had ASA grade I in group D and group A respectively. In this study maximum patients were male (e.g., 25) and female patients were 5 (2 patients in group-D & 3 patients in group-A).There were no significant between group differences in demographic or clinical characteristics, including age, weight and type of surgery.

Findings consistent with result of other studies. In a study mean age was 3.3 ± 1.4 year[12]. In a study median age was 5 (2–15)[13]. Similar study shows mean age 6.4 (1.1–16.0)[9].

In this study risk of laryngospasm was higher with awake group (26.6%) versus deep group (6.7%): risk ratio (RR) 1.23, 95% confidence interval (CI) 0.85 to 2.24. On evaluation of oxygen saturation (SPO2) value, decisive value was below 90%. More patients with oxygen saturation (deep vs awake events: 36.7% vs 13.3 %) were observed in the deep group compared to the deep group (difference of 20%). This difference was statistically significant (P=0.001). So overall findings suggested removal of the LMA under deep Anaesthesia may be safer and more successful than removal when patients are fully awake.

All findings accordance with result of other studies. In a study 283 patients were analysed and result shows that, a higher occurrence of adverse events was observed in the awake group, no evidence for a difference was found [45% vs 35%, odds ratio (OR): 1.5, 95% confidence interval (CI): 0.9–2.5, P=0.09]. However, in the postanaesthesia care unit, children with an awake rather than deep removal experienced significantly more adverse events [55 (39%) vs 37 (26%); OR: 1.85, 95%CI: 1.12–3.07, P=0.02].

Avoidance of coughing and retching during recovery from ENT and plastics anaesthesia is important in order to prevent venous congestion and the potential for subsequent haemorrhage. ENT practice is associated with a higher incidence of airway complications than other areas of anaesthesia and the need for airway control in this group of patients is critical if such problems are to be avoided. Study demonstrated a lower incidence of airway complications in both the anaesthetized and awake groups[5]. The major finding of a study was that the failure rate of LMA removal during emergence was lower in the "deep" group. After LMA removal, airway hyperreactivity scores did not differ significantly between the groups. There were 6 (9.84%) and 5 (8.33%) patients with airway hyperreactivity in the "awake' and "deep" groups, respectively (P¼0.98); all had scores of<3 in both groups.

Another study shows that laryngeal mask airway (LMA) has been shown to provide both a safe and controlled method of airway management during general anaesthesia in children[9]. Another study reported that removal of LMA during deep anaesthesia reduced coughing in the immediate postoperative period[15].

Although another study shows there were no significant differences in bronchospasm, laryngospasm, oxygen desaturation among subgroups. Significant differences were in cough and straining, breath holding, vomiting, and finally severity of airway hyperreactivity among four subgroups[1]. Dolling S, et al reported that, deep group had a higher incidence of patients with SpO2<95% (p = 0.003) and of patients who coughed (p = 0.003) and it is conclude that the LMA should be taken out awake in these patients[13]. This difference may be due to variance in sampling, surgical technique and study design like age, ethnicity. In this study all patients were children group. Previous study demonstrated that the use of an LMA and deep removal significantly reduced postoperative emergence agitation compared with awakeextubation. Deep extubation can reduce the incidence of agitation caused by the fear of being aware of intubation, the inability to speak and with sudden exposure of a psychologically immature patient (child) to an unfamiliar environment. These factors collectively combined to reduce the incidence of postoperative emergence agitation in the LMA-Deep group compared with awake group[12].

CONCLUSIONS:

This investigation suggested that LMA removal in children may be more successful in patients under deep Anaesthesia than in fully awake patients. The risks of complications such as laryngospasm, lowering of oxygen desaturation, coughing and salivation, etc are associated with LMA removal technique. Airway hyperreactivity and adverse events was milder in deep group.

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Prevention of Hypotension During Spinal Anaesthesia for Ceasarean Section: Fluid Preload Versus Ephedrine

Mohammad Abu Taher[1], Md. Mushfiqur Rahman[2], Mohiuddin[3], Md. Shariful Haque[4]

ABSTRACT

BACKGROUND: *Spinal anaesthesia induced maternal hypotension is the most common complication during cesarean section that has very much detrimental effects on both the mother and the fetus. The aim of this study was to compare the effectiveness of fluid preloading and use of ephedrine in the management of Spinal anaesthesia induced hypotension during cesarean section.* ***METHODS:*** *A total fifty pregnant women of ASA-I & II with single term fetus who presented for cesarean section under spinal anesthesia were included in this study . The patients were allocated randomly into two groups : Fluid preloading of group F (n=25) who received 15 ml/kg of Ringers lactate solution15 min before spinal anesthesia and the ephedrine group of E (n=25) who received prophylactic 5 mg ephedrine in first and second minute and 1mg every minute until10 min after Spinal anaesthesia. Haemodynamic variables and all postoperative complications were recorded.* ***RESULTS:*** *Systolic blood pressure changes were statistically significant. Demographic data and duration of procedures were comparable. Systolic blood pressure was generally higher in the E group than in the F group. Intraoperative heart rate increased in the E group than in the F group. It was not statistically significant. The incidence of hypotension and rescue boluses of ephedrine was significantly higher in the F group.* ***CONCLUSION:*** *The use of prophylactic ephedrine is superior to that of fluid preloading to maintain optimum blood pressure following spinal anaesthesia in cesarean section.*

Keywords: Spinal anaesthesia, Fluid preloading, Ephedrine, Systolic blood pressure, Cesarean Section, Heart rate.

INTRODUCTION

Spinal anaesthesia is usually induced in cesarean section as it provides a fast, effective and high quality of sensory and motor block, rapid onset, low risk of local anaesthetic toxicity and little transfer of drugs to the fetus [1,2]. Maternal hypotension is the most common complication during cesarean section under spinal anaesthesia. A higher incidence of hypotension is one of the limitation of this technique with a reported incidence of greater than 80%, if not prevented; it could be associated with severe nausea and vomiting[3]. It may even leads to serious risk of mother (Unconsciousness and pulmonary aspiration) and baby (hypoxia, acidosis).

Intravascular volume expansion using intravenous fluids left lateral uterine displacement and strict monitoring of blood pressure at frequent periods are effective measures taken for decreasing the risk of

AUTHORS AFFILIATIONS:
1. *Lt Col Dr. Mohammad Abu Taher, Classified Anaesthesiologist Combined Military Hospital, Rangpur cantonment, Rangpur.
2. Dr. Md. Mushfiqur Rahman, Associate Prof. Department of Surgery Prime Medical College Rangpur.
3. Dr. Mohiuddin Assistant Prof. Department of Anaesthesia Prime Medical College Rangpur.
4. Dr. Md. Shariful Haque Associate Prof. Department of Orthopedics Prime Medical College Rangpur.

*** For corrospondence.**

hypotension to varying degrees[4]. But none of these measures were found to be 100% effective[3].

The incidence of hypotension becomes exaggerated by a deficiency of intravascular volume due to sympathetic block by spinal anaesthesia. Traditionally, preloading of fluid was recommended for the prevention of hypotension following spinal anaesthesia. Hypotension immediately after spinal anaesthesia leads to cerebral hypo perfusion along with brainstem ischaemia and stimulation of vomiting centre[5,6]. In addition to that, there is hypo perfusion of gut that leads to release of emetogenic substances like serotonin[7]. Hypotension in traditionally combated with ephedrine which has a strong beta-adrenergic and a weak alpha-adrenergic effect[8]. In this prospective randomized controlled trial, it is hypothesized that administration of ephedrine may be more effective to combat hypotension compared with fluid preload during vasodilatation induced by spinal anaesthesia for cesarean section.

MATERIALS AND METHODS

This study was conducted on fifty pregnant women with ASA physical status I & II, aged 22-30 yrs scheduled for elective cesarean section under spinal anaesthesia admitted in Prime Medical College Hospital during the period of October 2018 to December 2019. Permission for the study was duly obtained from concerned authority. All emergency patients and patients with history of cardiac, hepatic and renal disease, tachycardia and hypertension treated with drugs and coagulation disorders were excluded.

Intravenous cannula (18G) was fixed in cephalic vein in the preparation room under local anaesthesia. After arrival at the operation theatre room, continuous monitoring of noninvasive blood pressure, pulse oximetry and ECG were carried out. No premedication was given to any patients. The patients were allocated randomly into two groups of 25 patients in each group. Group F received crystalloid preloading (Ringers lactate 15 ml/kg) 15 min before spinal anaesthesia. Group E received 10 ml/kg of Ringers lactate simultaneously with the block (Coload) and prophylactic 5 mg ephedrine intravenously at the first and second min after the spinal block. Then all patients were placed with a left lateral tilt for uterine displacement to prevent aorto-caval compression.

Under complete aseptic precaution, spinal block was induced in sitting position with 2.75 ml of 0.5% heavy bupivacaine and then the patient was placed in supine position with left uterine displacement. Conscious level, sensory and motor block were assessed. Surgery Started when the block extended T_5 or above.

Systolic blood pressure (SBP) and Heart rate (HR) were recorded at 1 min after spinal anaesthesia and then every 3 min for first 30 min and every 5 min later on until the end of surgery. Oxygen saturation was monitored using pulse oximetry continuously. Nausea, vomiting, dizziness and chest symptoms (dyspnea and tachypnea) were also recorded. Hypotension was defined as 20% decrease in SBP from the baseline that was treated with boluses of 5 mg of ephedrine. Nausea, vomiting was treated with 10 ml metoclopramide whether unrelated to hypotension or not corrected by ephedrine bolus dose alone in both groups. All patients received 10 IU oxytocin bolus and 10 IU oxytocin in 500 ml Ringers lactate solution as

drip. All patients were monitored postoperatively for heart rate, SBP, oxygen saturation, nausea and vomiting. Maternal bradycardia was defined as HR < 60 beat/min and it was treated immediately by using intravenous atropine. Fetal HR was also monitored by using cordio-tocorgraphy (CTG) continuously until delivery.

Satistical analysis :

Obtained data were presented as mean ± standard deviation or median (range) or percentage and interquartile range or count as appropriate. Comparison between two groups were performed using students t-test, x2-test or analysis of variance according to type of variance. Data were analyzed using computer package SPSS.

A 'P' value of 0.05 or less was considered statistically significant.

Sample size was calculated based on a previous study. Assuming an alpha-error of 0.05 and power of study 80%, a minimum of 50 patients (25 in each arm) was calculated as the sample size .

RESULTS

As regard demographic data (age, weight, height, ASA physical status and parity) there was no statistically significant difference between the two groups and also duration of anaesthesia (Table I)

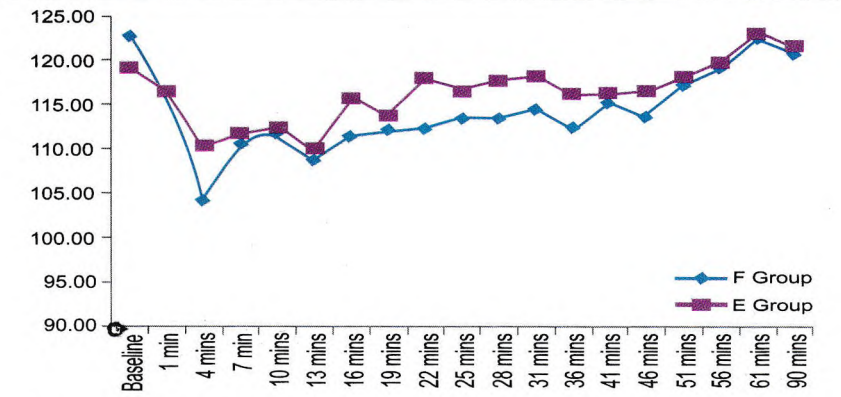
TABLE I: Demographic data of patients in the study

Variable	F group	E group	P value
Age	26 (22-30)	26 (22-29)	0.22
BMI	34.9 ± 1.6	34.8 ± 1.7	0.39
Height	163.8 ± 2.7	164.2 ± 2.7	0.25
Parity	2 (0-3)	1 (0-4)	0.43

Data expressed as mean and SD or range.

Baseline SBP was comparable between two groups. SBP was higher in the E group than in the F group. The results were not statistically significant (Fig 1).

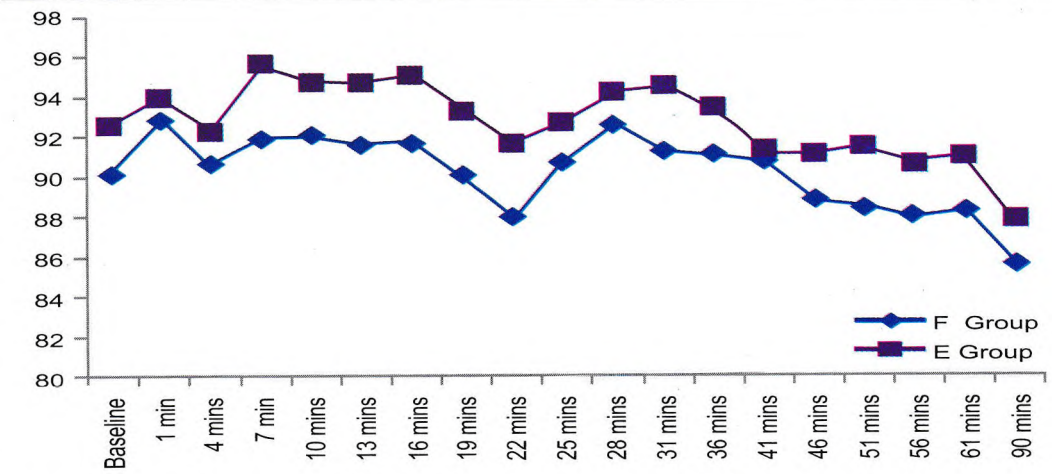
Figure 1



Systolic blood pressure trends (data are presented as mean)

Intraoperative HR is represented in Figure-2. HR was higher in the E group than in the F group. However, it was not statistically significant (Fig -2)

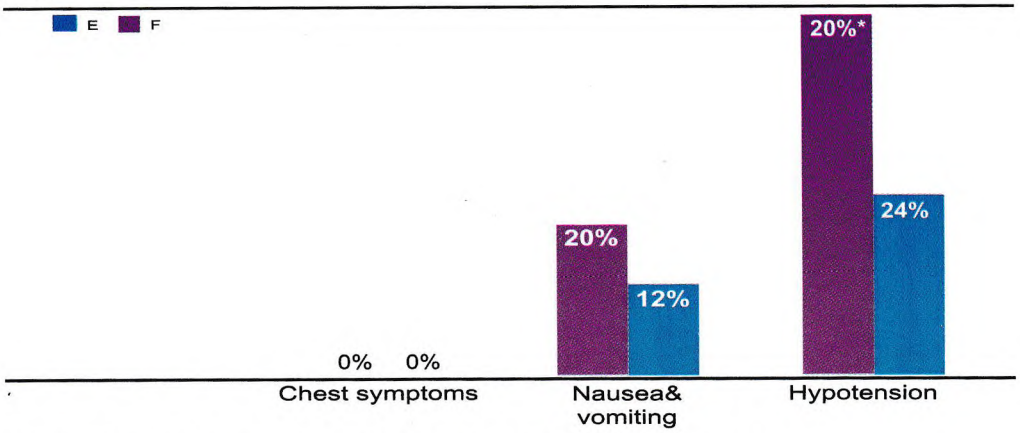
Figure 2



Mean heart rate trends against time (data are presented as mean).

The incidence of postoperative complications are represented (Figure 3) by number of patients and percentage. The incidence of hypotension was significantly higher in the F group than in the E group; the incidence of nausea and vomiting was higher in the F group than in the E group. But it was not statistically significant and there were no chest symptoms in both groups.

Figurc 3



Incidence of complications (*statistically significant).

The number of boluses of ephedrine required to correct hypotension was significantly lower in the E group (ephedrine group) than in the F group (Fluid preloading group). As regard oxygen saturation, there was no significant difference between the two groups Table II.

TABLE II: Number of ephedrine boluses required to correct hypotension :

Variable	F group	E group	P Value
Number of boluses	0.5 ± 0.9	0.2 ± 0.45	0.042*

Data are presented as mean ± SD; * P<0.05

DISCUSSION

This study was done on 50 pregnant women undergoing elective cesarean section under spinal anaesthesia. Spinal block is considered to be safer for the patients compared with general anaesthesia for cesarean section. Spinal anaesthesia is widely used anaesthetic technique for cesarean section. General anaesthesia is associated with higher mortality rate in comparison with regional anaesthesia. But on the other hand, spinal anaesthesia is not without risk. Hypotension during cesarean section under spinal anaesthesia is very common and if not treated in time can induce complications for the mother and fetus as well [9].

Intravenous preloading of fluid is the most popular nonpharmacological method to prevent spinal induced hypotension[9,10]. It is found that the use of low dose of ephedrine is associated with better control of maternal hypotension. Moreover, the incidence of nausea and vomiting was lower in the E group when compared with the F group. But this was not statistically significant.

Gunusen, et al tested the hypothesis that ephedrine infusion with crystalloid loading in spinal anaesthesia could decrease hypotension and change neonatal outcome compared with fluid preloading[10]. As regards the route of ephedrine administration, Rout and Rocke in their study on intramuscular ephedrine stated that was difficult to predict both absorption and peak effect of intramuscular ephedrine and also observed reactive hypertension, particularly if spinal anesthesia was unsuccessful[11]. Prophylactic intravenous ephedrine administered either by means of infusion or bolus doses has been considered the gold standard for preventing hypotension for many years. The effect of an intravenous bolus of ephedrine on arterial pressure is transient and it lasts for only 10-15 min[12]. Therefore, we considered intravenous ephedrine to be able to prevent spinal anesthesia induced hypotension and compared it with crystalloid preloading.

Bhovi and colleagues studied the efficacy of ephedrine in preventing hypotension in patients undergoing cesarean section under spinal anaesthesia. A total of 100 female patients between 18 and 40 years of age undergoing elective cesarean section under spinal anaesthesia were studied. They were randomly allocated to receive either ephedrine infusion (group A) or 20 ml/kg of Ringer's lactate solution as preloading solution before subarachnoid block (SAB) (group B). The incidence of hypotension was six of 50 (12%) in group A, and 30 to 50 (60%) in group B. The incidence of hypotension in the ephedrine group in this study was 12% whereas in our study the incidence of hypotension in the ephedrine group was 24%. This difference may be due to the different doses of ephedrine used and the different volumes of infusion[13]. In contrast to our study, Thiangtham and Asampinwat performed a concealed randomized study on 96 parturients who were divided into two groups: the study group

received 18 mg of ephedrine (3ml) added to 100 ml normal saline, and the control group received 103 ml of normal saline instead of ephedrine intravenous continuous infusion given over 10 min. All patients received preloading fluid with 20 ml/kg of lactated Ringer's solution 10 min before spinal block with 0.5% hyperbaric bupivacaine mixed with preservative free morphine. The incidence of hypotension was 93.8% in the control group and 85.4% in the study group (p=0.181), which was not statistically significant. This may be due to the small dose of ephedrine use and different infusion rate[14].

CONCLUSION

Intravenous use of ephedrine immediately following spinal anaesthesia can control hypotension effectively without significant hazards of other vital haemodynamic parameters. From the study it is obvious that ephedrine infusion is more effective compared with fluid preload in the prevention of hypotension due to spinal anaesthesia for cesarean section without causing significant tachycardia or hypertension.

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ORIGINAL ARTICLE

Morphological Study of Cusps of Right Atrioventricular Valve of Postmortem Human Heart

Mahmuda Sutana[1], Zakia Sultana[2], Mahmuda Khatoon[3], Md. Tazul Islam[4], Nusrath Jahan Chowdhury[5].

ABSTRACT:

INTRODUCTION: Valve cusps are the tapering projection of a cardiac valve, also called flaps or leaflets. For maintaining unidirectional blood flow through the valve ,valve cusps play an important role. Most frequent acquired valvular abnormalities are stenoses of the aortic and mitral valves, which account for approximately 2/3rd of all valve disease. Valvular stenosis almost always is due to a primary cuspal abnormality and is virtually always a chronic process. Replacement of damaged cardiac valves with prostheses has now become a common and often life-saving mode of therapy. This advancement has undoubtedly called for an improved anatomical knowledge on the part of the surgeon. This study gives an idea about the anatomy of cusp of right artioventricular valve. AIMS AND OBJECTIVE: To evaluate the morphology of cusps of right atrioventricular valves of postmortem human heart in different age group & sex. MATERIALS AND METHODS : This descriptive study was conducted in the Department of Anatomy, in collaboration with the Department of Forensic Medicine, Sylhet MAG Osmani Medical College, Sylhet during the period from July 2015 to June 2016.Study was performed on 70 post mortem human hearts of age ranging from 9 to 70 years. Human heart was collected from the unclaimed dead bodies autopsied in the department of Forensic medicine in Sylhet MAG Osmani Medical College during the study period fulfilling the inclusion criteria. The collected samples were divided into 3 groups depending on age. Group – A : (9 - 21 Years), Group - B: (22 - 41 Years), Group - C: (42 -70) Years. Each group was subdivided into two groups depending on their sex. RESULTS: The height of anterior cusp of tricuspid valve was maximum in Group C and minimum in Group B. There was no significant difference between group-A and B ($p=0.472$); group-A and C ($p=0.394$); and group-B and C ($p=0.104$); while significantly greater in male and than that of female ($p=0.035$).The height of posterior cusp of tricuspid valve was maximum in Group C and minimum in Group A. There was no significant difference between group-A and B ($p=0.655$); group-A and C ($p=0.603$); and group-B and C ($p=0.887$); and also between male and female ($p=0.055$) The height of septal cusp of tricuspid valve was maximum in Group B and minimum in Group A. There was no significant difference between group-A and B ($p=0.591$); group-A and C ($p=0.900$); and group-B and C ($p=0.703$); while significantly greater in male and than that of female ($p=0.034$).The width of anterior cusp of tricuspid valve was maximum in Group C and minimum in Group A. There was significant difference between group-A and B ($p<0.001$); group-A and C ($p=0.001$); but no significant difference between age group-B and C ($p=0.921$); and also between male and female ($p=0.264$).The width of posterior cusp of tricuspid valve was maximum in Group B and minimum in Group A. There was significant difference between group-A and B ($p=0.001$); group-A and C ($p=0.006$); but no significant difference between age group-B and C ($p=0.840$); while significantly greater in male and than that of female ($p=0.037$). The width of septal cusp of tricuspid valve was maximum in Group C and minimum in Group A. There was significant difference between group-A and B ($p<0.001$); group-A and C ($p<0.001$); but no significant difference between age group-B and C ($p=0.728$); and also between male and female ($p=0.159$). CONCLUSION: From this study, it provides an idea about the anatomy of cusps of right atrioventricular valve of the heart and their changes in relation to age and gender of Bangladeshi people.

Key words: Heart, Valve cusp, Atrioventricular valve, Tricuspid valve.

INTRODUCTION:

The heart is a hollow, fibromuscular organ which is conical or pyramidal in form, with a base, apex and a series of surfaces and borders. Enclosed in the pericardium, it occupies the middle mediastinum between the lungs and their pleural coverings. It is placed obliquely behind the body of the sternum and the adjoining costal cartilages and ribs. Approximately one-third of the heart lies to the right of the midline[1].

The heart has four chambers: right and left

AUTHOR'S AFFILIATIONS

• Dr. Mahmuda Sutana,*
Assistant Professor,
Department of Anatomy,
Parkview Medical College, Sylhet.
Mobile: +8801793164303.
Email: mahmudasultana90@gmail.com .

• Dr. Zakia Sultana,
Professor & Head
Department of Anatomy
Sylhet MAG Osmani Medical College, Sylhet.
• Dr. Mahmuda Khatoon,
Assistant Professor
Department of Anatomy
Ibn Sina Medical College, Dhaka.
• Dr. Md. Tazul Islam,
Lacturer, Department of Biochemistry
Sheikh Hasina Medical College, Hobigonj.
• Dr. Nusrath Jahan Chowdhury,
Assistant Professor
Department of Physiology
Parkview Medical College, Sylhet.
* For Correspondence

atria, right and left ventricles. Each of these chambers plays a role in the continuous process of blood circulation. The right ventricle is joined with the right atrium by the tricuspid valve and left ventricle communicates with the left atrium by mitral valve.

Valve cusps are the tapering projection of a cardiac valve, also called flaps or leaflets[2].

The free borders of the cusps of the tricuspid and mitral valve attached to papillary muscles by chordae tendineae[3].

Cusps of mitral valve are three and named anterior, posterior and septal according to their attachment of annulus. Each cusp has two surfaces (atrial and ventricular). All cusps of the atrioventricular valves, passing from the free margin to the inserted margin, rough, clear and basal zones. The anterosuperior cusp is the largest component of the tricuspid valve. It is attached chiefly to the atrioventricular junction on the posterolateral aspect of the supraventricular crest. The attachment of the septal cusp passes from the inferoseptal commissure on the posterior ventricular wall across the muscular septum. The inferior or posterior cusp is mural in attachment and guards the diaphragmatic surface of the atrioventricular junction. Its limits are the inferosepta land anteroinferior commissures. Each cusp is formed by the reduplication of endothelium containing lamina fibrosa.

MATERIALS AND METHODS:

This descriptive study was conducted in the Department of Anatomy, in collaboration with the Department of Forensic Medicine, Sylhet MAG Osmani Medical College, Sylhet during the period from July 2015 to June 2016. Seventy human postmortem hearts were collected from the dead bodies autopsied within 36 hours of death. Considerable signs of decomposition or decomposed dead body, any gross heart disease were excluded. The obtained Hearts were classified according to the age and sex. Particulars of dead body were collected from police inquest report and chalan. Heart was collected after standard procedure of autopsy. Unwanted tissues were cleared and heart was washed thoroughly with normal saline and was gently squeezed to remove the clotted blood from the cavity of the heart.Congenital anomalies of heart was excluded after dissection. Each specimen was duly tagged by a piece of waxed cloth bearing an identifying number which was considered as serial number. Then the specimen was fixed and preserved in 10% formalin.

Grouping and distribution of cases
The collected samples were divided into 3 groups depending on age[4].
Group - A: 9 - 21 Years.
Group - B: 22 - 41 Years.
Group - C: 42 -70 Years.
Each group was subdivided into two groups depending on their sex.

In this study the age of the cadaver ranged from 9 to 70 years, where the lowest age is 9 & highest age is 70 depending upon the avail-

ability of specimen.

Parameters of the Cusps of right atrio-ventricular valve:

i) Number of cusps

ii) Height of the individual cusp: anterior, posterior and septal

iii) Width of the individual cusp: anterior, posterior and septal.

Measurement of different Parameters of the Right Atrioventricular valve cusps:

For the measurement of different dimensions of the right atrioventricular valve cusps the annulus of right atrioventricular orifice was cut open and stretched flat.

Number of valve cusps: The number of cusps of each atrioventricular valve was counted to note the absence or presence of any extra cusp along with its position on the orifices.

Measurement of height of valve cusps: The height of each cusp was measured from the midpoint of its free edge to the midpoint of its base at the annulus fibrosus. Measurements was made with a metric scale and non-stretchable nylon thread. The values was expressed in centimeters[5].

Measurement of width of valve cusps: The width of each cusp was measured at its base from one commissure to another with the help of a metric scale and non-stretchable nylon thread. The latter first placed on base (annulus) of the cusps and subsequently stretched and compared with the metric scale. The combined measurement of the individual cusp gave the circumference of the orifice[5].

RESULTS:

Distribution of height of cusps of right atrio-ventricular valve among different age group:

The height of anterior cusp of tricuspid valve was 1.53 ± 0.44 cm in the age group-A (9-21 years), 1.44 ± 0.49 cm in the age group-B (22-41 years) and 1.67 ± 0.47 cm in the age group-C (42-70 years). There was no significant difference of height of anterior cusp of tricuspid valve between age group-A and age group-B (p=0.472); age group-A and age group-C (p=0.394); and age group-B and age group-C (p=0.104).

The height of posterior cusp of tricuspid valve was 1.17 ± 0.32 cm in the age group-A (9-21 years), 1.22 ± 0.46 cm in the age group-B (22-41 years) and 1.24 ± 0.38 cm in the age group-C (42-70 years). There was no significant difference of height of posterior cusp of tricuspid valve between age group-A and age group-B (p=0.655); age group-A and age group-C (p=0.603); and age group-B and age group-C (p=0.887).

The height of septal cusp of tricuspid valve was 0.95 ± 0.27 cm in the age group-A (9-21 years), 1.01 ± 0.50 cm in the age group-B (22-41 years) and 0.97 ± 0.34 cm in the age group-C (42-70 years). There was no significant difference of height of septal cusp of tricuspid valve between age group-A and age group-B (p=0.591); age group-A and age group-C (p=0.900); and age group-B and age group-C (p=0.703).

Table-I: Distribution of height of cusps of right atrio-ventricular valve among different age group (n=70)

Parameter	Age group		
	Group-A (n=20)	Group -B (n=32)	Group-C (n=18)
Height of anterior cusp of tricuspid valve (cm)	1.53 ± 0.44	1.44 ± 0.49	1.67 ± 0.47
p-value	A vs B, p=0.472; A vs C, p=0.394; B vs C, p=0.104		
Height of posterior cusp of tricuspid valve (cm)	1.17 ± 0.32	1.22 ± 0.46	1.24 ± 0.38
p-value	A vs B, p=0.655; A vs C, p=0.603; B vs C, p=0.887		
Height of septal cusp of tricuspid valve (cm)	0.95 ± 0.27	1.01 ± 0.50	0.97 ± 0.34
p-value	A vs B, p=0.591; A vs C, p=0.900; B vs C, p=0.703		

*P-value was obtained from ANOVA with post hoc test. P<0.05 indicates significant and p<0.001 in highly significant.

Distribution of width of cusps of right atrio-ventricular valve among different age group

The width of anterior cusp of tricuspid valve was 3.04 ± 0.52 cm in the age group-A (9-21 years), 3.57 ± 0.58 cm in the age group-B (22-41 years) and 3.58 ± 0.34 cm in the age group-C (42-70 years). There was significant difference of width of anterior cusp of tricuspid valve between age group-A and age group-B (p<0.001); and age group-A and age group-C (p=0.001); but no significant difference between age group-B and age group-C (p=0.921).

The width of posterior cusp of tricuspid valve was 2.42 ± 0.60 cm in the age group-A (9-21 years), 2.98 ± 0.58 cm in the age group-B (22-41 years) and 2.94 ± 0.49 cm in the age group-C (42-70 years). There was significant difference of width of posterior cusp of tricuspid valve between age group-A and age group-B (p=0.001); and age group-A and age group-C (p=0.006); but no significant difference between age group-B and age group-C (p=0.840).

The width of septal cusp of tricuspid valve was 1.40 ± 0.45 cm in the age group-A (9-21 years), 2.02 ± 0.61 cm in the age group-B (22-41 years) and 2.08 ± 0.60 cm in the age group-C (42-70 years). There was significant difference of width of septal cusp of tricuspid valve between age group-A and age group-B (p<0.001); and age group-A and age group-C (p<0.001); but no significant difference between age group-B and age group-C (p=0.728).

Distribution of width of cusps of tricuspid valve among different age group was shown in Table II

Table-II Distribution of width of cusps of right atrio-ventricular valve of heart among different age group (n=70)

Parameter	Age group		
	GroupA (n=20)	GroupB (n=32)	GroupC (n=18)
Width of anterior cusp of tricuspid valve (cm)	3.04 ± 0.52	3.57 ± 0.58	3.58 ± 0.34
p-value	A vs B, p<0.001; A vs C, p=0.001; B vs C, p=0.921		
Width of posterior cusp of tricuspid valve (cm)	2.42 ± 0.60	2.98 ± 0.58	2.94 ± 0.49
p-value	A vs B, p=0.001; A vs C, p=0.006; B vs C, p=0.840		
Width of septal cusp of tricuspid valve (cm)	1.40 ± 0.45	2.02 ± 0.61	2.08 ± 0.60
p-value	A vs B, p<0.001; A vs C, p<0.001; B vs C, p=0.728		

*P-value was obtained from ANOVA with post hoc test. P<0.05 indicates significant and p<0.001 in highly significant.

Distribution of height of cusps of right atrio-ventricular valve between male and female:

The height of anterior cusp of tricuspid valve was 1.60 ± 0.50 cm in male and 1.34 ± 0.36 cm in female. There was significant difference of height of anterior cusp of tricuspid valve of heart between male and female (t=2.146; p=0.035).

The height of posterior cusp of tricuspid valve was 1.27 ± 0.44 cm in male and 1.07 ± 0.26 cm in female. There was no significant difference of height of posterior cusp of tricuspid valve of heart between male and female (t=1.951; p=0.055).

The height of septal cusp of tricuspid valve was 1.05 ± 0.44 cm in male and 0.83 ± 0.25 cm in female. There was significant difference of height of septal cusp of tricuspid valve of heart between male and female (t=2.162; p=0.034).

Distribution of height of cusps of tricuspid valve between male and female was shown in Table III.

Table-III: Distribution of height of cusps of the right atrio-ventricular valve of heart between male and female (n=70)

Parameter	Sex		p-value
	Male (n=49)	Female(n=21)	
Height of anterior cusp of tricuspid valve (cm)	1.60 ± 0.50	1.34 ± 0.36	p=0.035
Height of posterior cusp of tricuspid valve (cm)	1.27 ± 0.44	1.07 ± 0.26	p=0.055
Height of septal cusp of tricuspid valve (cm)	1.05 ± 0.44	0.83 ± 0.25	p=0.034

*P-value was obtained from unpaired t test. P<0.05 indicates significant and p<0.001 in highly significant.

Distribution of width of cusps of tricuspid valve between male and female:

The width of anterior cusp of tricuspid valve was 3.47 ± 0.58 cm in male and 3.31 ± 0.46 cm in female. There was no significant difference of width of anterior cusp of tricuspid valve between male and female (t=1.126; p=0.264). The width of posterior cusp of tricuspid valve was 2.91 ± 0.62 cm in male and 2.58 ± 0.52 cm in female. There was significant difference of width of posterior cusp of tricuspid valve between male and female (t=2.131; p=0.037). The width of septal cusp of tricuspid valve was 1.93 ± 0.61 cm in male and 1.70 ± 0.66 cm in female. There was no significant difference of width of septal cusp of tricuspid valve between male and female (t=1.423; p=0.159). Distribution of width of cusps of tricuspid valve between male and female was shown in Table IV.

Table-IV: Distribution of different dimensions of width of cusps of right atrio-ventricular valve of heart between male and female (n=70)

Parameter	Sex		p-value
	Male (n=49)	Female (n=21)	
Width of anterior cusp of tricuspid valve (cm)	3.47 ± 0.58	3.31 ± 0.46	p=0.264
Width of posterior cusp of tricuspid valve (cm)	2.91 ± 0.62	2.58 ± 0.52	p=0.037
Width of septal cusp of tricuspid valve (cm)	1.93 ± 0.61	1.70 ± 0.66	p=0.159

*P-value was obtained from unpaired t test. P<0.05 indicates significant and p<0.001 in highly significant.

DISCUSSION:

In this study the age of the cadaver ranged from 9 to 70 years with the mean age of 31.96 (SD ± 17.17) years. In this regards Farzana found that age of the cadaver ranged from 0 to 60 years[4].

This study revealed that the height of anterior cusp of tricuspid valve was 1.53 ± 0.44 cm in the age group-A (9-21 years), 1.44 ± 0.49 cm in the age group-B (22-41 years) and 1.67 ± 0.47 cm in the age group-C (42-70 years). There was no significant difference of height of anterior cusp of tricuspid valve between age group-A and age group-B (p=0.472); age group-A and age group-C (p=0.394); and age group-B and age group-C (p=0.104). The height of anterior cusp of tricuspid valve was 1.60 ± 0.50 cm in male and 1.34 ± 0.36 cm in female. There was significant difference of height of anterior cusp of tricuspid valve of heart between male and female (p=0.035). Farzana reported that the mean height of anterior cusp was 1.34 ± 0.30, 1.77 ± 0.34 and 1.85 ± 0.39 cm in Group A (0 to 20 years), Group B (21 to 40 years) and Group C (41 to 60 years) respectively[4]. The mean difference of height of anterior cusp between Groups A and C was statistically significant but

difference between Groups A and B and B and C was statistically not significant. Begum found that the mean height of the anterior cusp of tricuspid valve was 1.87 ± 0.28 cm in males and 1.95 ± 0.19 cm in females[5]. There was no significant difference (p>0.05) in the height of the anterior cusp between males and females. These values are somewhat less than the findings of Silver et al which were 2.4 ± 0.4 cm in males and 2.1 ± 0.7 cm in females[6]. Yavuz et al measured the mean height of the anterior cusps was 2.4cm in males and 1.9 cm in females[7]. Mannan found the mean height of the anterior cusp was 2.24 cm in males and 1.56 cm in females[8]. Skwarek et al studied the height of the main leaflets were for the anterior leaflet 20.71 ± 5.23 mm[9].

The height of posterior cusp of tricuspid valve was 1.17 ± 0.32 cm in the age group-A (9-21 years), 1.22 ± 0.46 cm in the age group-B (22-41 years) and 1.24 ± 0.38 cm in the age group-C (42-70 years). There was no significant difference of height of posterior cusp of tricuspid valve between age group-A and age group-B (p=0.655); age group-A and age group-C (p=0.603); and age group-B and age group-C (p=0.887).The height of posterior cusp of tricuspid valve was 1.27 ± 0.44 cm in male and 1.07 ± 0.26 cm in female. There was no significant difference of height of posterior cusp of tricuspid valve of heart between male and female (p=0.055). Begum found that the mean height of the posterior cusp of the tricuspid valve in males was 1.87 ± 0.82 cm and in females 1.66 ± 0.26 cm. There was no significant difference (P>0.05) was noted when statistical comparison was made[5]. Silver et al studied the height of the posterior cusp of the tricuspid valve and found that the mean value was 1.9 cm in males and 1.6 cm in females[6]. The values of the present study are somewhat similar to the above mentioned studies. Farzana reported that the mean height of posterior cusp was 1.28 ± 0.34, 1.69 ± 0.37 and 1.74 ± 0.43 cm in Group A (0 to 20 years), Group B (21 to 40 years) and Group C (41 to 60 years) respectively[4]. The mean difference of height of posterior cusp between Groups A and C was statistically significant but difference between Groups A and B and B and C was statistically not significant. Yavuz et al[7] measured the mean height of the posterior cusps 1.8 cm in males and 1.6 cm in females. Mannan found the mean height for the posterior cusp was 1.73cm in males and 1.48 cm in females[8]. Skwarek et al studied the height of the posterior leaflet 18.88 ± 4.66 mm[9].

In this study the height of septal cusp of tricuspid valve was 0.95 ± 0.27 cm in the age group-A (9-21 years), 1.01 ± 0.50 cm in the age group-B (22-41 years) and 0.97 ± 0.34 cm in the age group-C (42-70 years). There was no significant difference of height of septal cusp of tricuspid valve between age group-A and age group-B (p=0.591); age group-A and age group-C (p=0.900); and age group-B and age group-C (p=0.703). The height of septal cusp of tricuspid valve was 1.05 ± 0.44 cm in male and 0.83 ± 0.25 cm in female. There was significant difference of height of septal cusp of tricuspid valve of heart between male and female (p=0.034). Begum found that the mean height of the septal cusp in males was 1.60 ± 0.31cm and in females 1.79 ± 0.33 cm[5]. There was no significant difference (P>0.05) between males and females. The values of the present study were somewhat similar to the values observed by Silver et al The value was 1.7 cm in males and 1.5 cm in females[6]. Farzana reported that the mean height of septal cusp was 0.89 ± 0.30, 1.46 ± 0.31 and 1.58 ± 0.41 cm in Group A (0 to 20 years), Group B (21 to 40 years) and Group C (41 to 60 years)

respectively[4]. The mean difference of height of septal cusp between Groups A and B and A and C was statistically significant but difference between Groups B and C was statistically not significant. Yavuz et al measured the mean height of septal cusps 1.9 cm in males and 1.7 cm in females[7]. Mannan found the mean height of the septal cusp was 1.63 cm in males and 1.40 cm in females[8]. Skwarek et al studied the height of the septal leaflet 17.22 ± 4.71 mm[9].

This study showed that the width of anterior cusp of tricuspid valve was 3.04 ± 0.52 cm in the age group-A (9-21 years), 3.57 ± 0.58 cm in the age group-B (22-41 years) and 3.58 ± 0.34 cm in the age group-C (42-70 years). There was significant difference of width of anterior cusp of tricuspid valve between age group-A and age group-B ($p<0.001$); and age group-A and age group-C ($p=0.001$); but no significant difference between age group-B and age group-C ($p=0.921$). The width of anterior cusp of tricuspid valve was 3.47 ± 0.58 cm in male and 3.31 ± 0.46 cm in female. There was no significant difference of width of anterior cusp of tricuspid valve between male and female ($p=0.264$). Begum found that the mean width of the anterior cusp in males was 3.24 ± 0.73 cm and 3.23 ± 0.46 cm in females[5]. There was no significant difference ($P>0.05$) in width of the anterior cusp between males and females. These values are somewhat lower than Silver et al[6]. which were 3.9 ± 0.8 cm in males and 3.5 ± 6.7 cm in females. The difference is more likely to be due to racial factor. Although the findings of the present study are greater than the findings observed by Schlant et al, their findings were 2.2 cm[10]. The authors did not mention about the sex, age or race of the subjects. Farzana reported that the mean width of anterior right atrioventricular cusps was in Group A 3.05±0.58, B 3.75±0.27 and C 3.96±0.50 cm respectively[4] . The mean difference of width of anterior right atrioventricular cusps between Groups A and B, B and C and A and C was statistically not significant at $p>.05$ level. Yavuz et al studied the structure of the human tricuspid valve and found that the mean width of the anterior cusps was 3.8 cm in males and 3.4 cm in females[7]. Mannan measured the width of the individual cusps of right atrioventricular valves and found the mean width of the anterior cusp were 3.65 cm in males and 3.55 cm in females[8].Skwarek et al studied in a group of 107 formalin-fixed adult human hearts, for the morphology and normal anatomy of the right atrio-ventricular valves. The average width of the anterior cusp was 31.98 mm[9].

In the present study the width of posterior cusp of tricuspid valve was 2.42 ± 0.60 cm in the age group-A (9-21 years), 2.98 ± 0.58 cm in the age group-B (22-41 years) and 2.94 ± 0.49 cm in the age group-C (42-70 years). There was significant difference of width of posterior cusp of tricuspid valve between age group-A and age group-B ($p=0.001$); and age group-A and age group-C ($p=0.006$); but no significant difference between age group-B and age group-C ($p=0.840$). The width of posterior cusp of tricuspid valve was 2.91 ± 0.62 cm in male and 2.58 ± 0.52 cm in female. There was significant difference of width of posterior cusp of tricuspid valve between male and female ($p=0.037$). Begum found that the mean width of the posterior cusp in males was 3.32 ± 0.52 cm and in females 3.55 ± 0.85 cm[5]. There was no significant difference ($P>0.05$) in the width of the posterior cusp between males and females. These values are somewhat higher than that of Silver et al which were 2.0 ± 0.6 cm in male and 1.6 ± 0.5 cm in female[6]. Farzana observed that the mean (±SD) width of posterior right atrioventricular cusp was in

Group A 2.34±0.61, B 3.10±0.42 and C 3.32±0.49 cm respectively and it was also observed that the mean width of posterior right atrioventricular cusp increased with age[4] . The mean difference of width of posterior right atrioventricular cusp between Groups A and B, A and C was statistically highly significant at p<.001 level but B and C was statistically not significant at p>.05 level.Yavuz et al studied that the mean width of the posterior cusps was 3.1 cm in males and 2.6 cm in females[7]. Mannan measured the width of the individual cusps of right atrioventricular valves and found the mean width of the posterior cusp were 3.08 cm in males and 2.93 cm in females[8]. Skwarek et al found the average width of the posterior cusp was 24.1 mm[9].

This study showed that the width of septal cusp of tricuspid valve was 1.40 ± 0.45 cm in the age group-A (9-21 years), 2.02 ± 0.61 cm in the age group-B (22-41 years) and 2.08 ± 0.60 cm in the age group-C (42-70 years). There was no significant difference of width of septal cusp of tricuspid valve between age group-A and age group-B (p<0.001); and age group-A and age group-C (p<0.001); but no significant difference between age group-B and age group-C (p=0.728). The width of septal cusp of tricuspid valve was 1.93 ± 0.61 cm in male and 1.70 ± 0.66 cm in female. There was no significant difference of width of septal cusp of tricuspid valve between male and female (p=0.159). Farzana observed that the mean width of septal right atrioventricular cusp was 1.47 ± 0.43, 2.09 ± 0.61 and 2.25 ± 0.81 cm in Group A (0 to 20 years), Group B (21 to 40 years) and Group C (41 to 60 years) respectively and it was also observed that the mean width of septal right atrioventricular cusp increased with age4. The mean difference of width of right septal atrioventricular cusp between Groups A and B, A and C was statistically highly significant but difference between B and C was statistically not significant. Begum found that the mean width of the septal cusp in males was 2.87 ± 0.59 cm and in females 2.70 ± 0.58 cm[5]. There was no significant difference (P>0.05) in the width of the septal cusp between males and females. The findings of the present study are less than that of observed by Silver et al[6]. Their observation was 3.7 ± 0.8 cm in males and 3.5 ± 0.8) cm in females. But the findings of the present study were greater than the values observed by Schlant et al that the width of septal cusp of tricuspid valve was 1.2 cm[10]. Yavuz et al measured the mean width of the septal cusps was 3.9 cm in males and 3.9 cm in females[7]. Mannan measured the width of the individual cusps of right atrioventricular valves and found the mean width of the septal cusp were 2.38 cm in males and 1.98 cm in females[8]. Skwarek et al studied the morphology and normal anatomy of the right atrio-ventricular valves and found that the average width of the septal cusp was 32.16 mm[9].

CONCLUSION

From the results a single set of conclusion could not drawn, but are expected to provide an idea about the morphology of the cusps of tricuspid valve of the heart and their changes in relation to age and gender of Bangladeshi people.

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REVIEW ARTICLE

Egg Consumption and its Effects on Cardiovascular Health

Mominul Haque[1], Noor Islam[2], Motiur Rahman[3]

ABSTRACT

Egg consumption is a common food habit. The cholesterol present in the eggs was thought to be harmful especially for those with cardiovascular diseases. Therefore its consumption was restricted. But most of the results of the researches conducted during the last fifty years have shown that eggs/and dietary cholesterol are not associated with increased cardiovascular risk. However, a recent study shows the harmful effects of consumption of dietary cholesterol or eggs. Under these circumstances, the fact regarding the usefulness of consumption of dietary cholesterol or egg yolk should be discovered.

KEY WORDS: Egg consumption, cardiovascular health.

INTRODUCTION:

Chicken eggs and duck eggs are frequently taken throughout the world. Quail eggs are also consumed. Eggs are a great source of a complete high quality protein with few calories[1]. Eggs contain choline which is important especially since our bodies cannot produce enough of it[1].Without enough choline, one can also become deficient in another essential nutrient, folic acid. Egg whites are a low-calorie, fat-free food[1].They contain the bulk of the egg's protein. The egg white contains about 4 grams of protein and 55 mg of sodium and produces 17 calories only. A single egg white contains 1.3 micrograms of folate, 6.6 mcg of selenium. 2.3 mg of calcium, 3.6 mg of magnesium, 4.9 mg of phosphorus and 53.8 mg of potassium also[1].

Egg yolks carry the cholesterol, the saturated fat of egg. Many nutrients also present, such as the fat soluble vitamins, essential fatty acids. One egg yolk has 4.5 grams of total fat of which 1.6 grams of saturated fat, 210 mg of cholesterol, 8 mg of sodium and 2.7 grams of protein. Thus the entire egg gives the most complete nutrition and give 55 calories[1].

There is a debate regarding the usefulness of the egg for the patients with cardiovascular diseases and also regarding the frequency of taking eggs in a healthy person. The results of various research works throughout the world

AUTHORS AFFILIATION:

1. *Prof. Dr. Md. Mominul Haque
Professor (C C)
Department Of Physiology
Prime Medical College, Rangpur.
Email: mominphysiol@gmail.com
Cell phone: 01712807357
2. Prof. Dr. Md. Noor Islam
Professor of Medicine
Principal, Prime Medical College, Rangpur
3. Dr. Motiur Rahman
Assistant Professor
Department of Community Medicine
Prime Medical College, Rangpur
***For Correspondence**

regarding its usefulness are not identical. Some researchers found significant good results whereas others found a quite different one[1,2]. Therefore, a definite and distinct information is verily desired.

DISCUSSION:

Donald J McNamara by their research works shows that egg intake had minimal effect on plasma lipoprotein level[2]. Whereas other researchers suggested that consumption of up to one egg per day is unlikely to have substantial overall impact on the risk of coronary heart disease or stroke among healthy men and women[3].They found apparently increased risk of coronary heart disease associated with higher egg consumption among diabetic participants[3].

In Framingham study they had investigated the effect of host and environmental factors on the development of coronary heart disease where serum cholesterol level was determined to the one of the risk factors for coronary heart diseases. A review of egg consumption on each of 912 subjects where the serum cholesterol distribution curves of the subjects according to tertile of egg intake were almost identical, and no relationship between egg intake and coronary heart disease was found. It was concluded that within the range of egg intake of this population differences in egg consumption were unrelated to blood cholesterol level or to coronary heart disease incidence[4].

Researchers of Japan Public Health Centre done a prospective study on association of egg consumption and total cholesterol concentration with the risk of CHD. A total of 90735 subjects (19856 men and 21408 women, aged 40-49 years in cohort I; 23463 men and 26008 women, aged 40-69 years in cohort II) were followed from 1990-1994 to the end of 2001. Total cholesterol was obtained in 36% of the subjects. Men and women were combined for the analysis. The subjects were categorized into four groups according to egg consumption. Subjects with total cholesterol > or = 2200 mg/l were less frequently in frequent egg consumption groups in both cohorts (trend P<0.0001). Subjects with <1 d/week of egg consumption were more likely to avoid a cholesterol-rich diet. Egg consumption was not associated with the risk of CHD, although total cholesterol was significantly related to the risk of CHD. The multivariate hazard ratio of CHD in subjects with total cholesterol > or = 2400 v. < 1800 mg/l was 2.17 (95% Cl 1.22, 3.85; trend P = 0.0018). Therefore eating egg more frequently up to almost daily, was not associated with increase in CHD incidence for middle aged Japanese men and women[5].

In another meta-analysis they did not support that higher egg consumption is associated with elevated risk of coronary heart disease and stroke[6]. The study were done on a 382 adult samples with average age 60 years (range 23-89 years) the egg eating category were inversely associated with dyslipidaemia but not with the other cardiovascular risk factors. They found that the consumption of more than one egg per week was associated with a lower coronary atherosclerotic burden[7].

All together of 22 independent cohorts from 16 studies were identified including participants ranging in number of 1600 to 90735 and in follow up time from 5.8 to 20.0 years. The meta-analysis suggested that egg consumption is not associated with the risk of cardiovascular disease and cardiac mortality in the general

population and cardiovascular disease comorbidity among diabetic patients[8]. Another study suggests that a diet including more eggs than a recommended (at least in some countries) may be used safely as part of a healthy diet in both the general population and for those at high risk of cardiovascular disease, those with established coronary heart disease and those with type 2 diabetes mellitus[9]. A research work in China showed that among the Chinese adults, a moderate level of egg consumption was significantly associated with lower risk of cardiovascular diseases, largely independent of other risk factors[10].

The electronic databases of PubMed Web of Science and Enbase were analised up to August 2017, for prospective cohort studies on the association between red meat, poultry, or egg consumption with the risk of hypertension. The pooled relative risk (RR) of hypertension for the highest vs. lowest category of red meat, poultry, and egg consumption as well as their corresponding 95% confidence interval (CI) were calculated. A total of eight articles made up of 10 prospective cohort studies, which involved 351,819 participants and 5000 hypertension cases, were included in this meta-analysis. Specifically nine studies were related to red meat consumption, and the overall multi-variable adjusted RR showed a positive association between red meat consumption and the risk of hypertension (RR=1.22,95% CI: 1.11-1.35; P< 0.001). In the sub group analysis that consisted of five studies, both processed (RR= 1.12, 95% CI: 1.02- 1.23; P= o.02) and unprocessed (RR= 1.19, 95% CI: 1.04-1.36; P= 0.01) red meat were associated with a higher risk of hypertension. In addition, in the six studies related to poultry consumption, the overall multivariable adjusted RR demonstrated that poultry consumption was associated with a higher risk of hypertension (RR= 1.15, 95% CI: 1.03-1.28; P= 0.015). Moreover, three of the studies that were included was related to egg consumption, and the overallmulti-variable-adjusted RR showed that egg consumption was associated with a lower risk of hypertension (RR= o.79, 95% CI: 0.68-0.91; P= 0.001. The existing evidence suggested that red meat (both processed and unprocessed) and poultry consumption were associated with a higher risk of hypertension, while egg consumption was associated with a lower risk of hypertension. Owing to the limited number of studies, more well designed prospective cohort studies are needed to further elaborate the issues examined in this study[11].

An original investigation article published in JAMA in 2019 with the title "Association of Dietary Cholesterol or Egg Consumption with Incidental Cardiovascular Disease and Mortality." The results of this investigation are not similar with the results of most of the investigations described above.

Among 29615 adults pooled from 6 prospective cohort studies in the United States with a median follow-up of 17.5 years, each additional 300 mg of dietary cholesterol consumed per day was significantly associated with higher risk of incident CVD (adjusted hazard ratio[HR], 1.7; adjusted absolute risk difference [ARD], 3.24%) and all-cause mortality (adjuster HR, 1.18; adjusted ARD, 4.43%), and each additional half an egg consumed per day was significantly associated with higher risk of incident CVD (adjusted HR, 1.06; adjusted ARD, 1.11%) and all-cause mortality (adjusted HR, 1.08; adjusted ARD, 1.93%).Therefore, among US adults, the higher consumption of dietary cholesterol or egg was significantly associated with higher risk of incident CVD and all-cause mortality in a dose

response manner[12].

CONCLUSION:

Eggs are popular food and being consumed widely in almost all communities in this world. As the results of investigations regarding the relationship between the consumption of cholesterol or egg with cardiovascular diseases are still contradictory, much more acceptable research activities in this respect should be continued. Then the established results should be considered in the development of dietary guidelines.

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