ISSN: 2304-2311 (Print)
ISSN: 2304-8905 (Online)

RANGPUR COMMUNITY MEDICAL COLLEGE JOURNAL
(RCMC JOURNAL)

January 2025 Vol. 8 No. 1

Editorial

Original Articles

RANGPUR COMMUNITY MEDICAL COLLEGE JOURNAL
(RCMC JOURNAL)

January 2025 | Vol. 8 | No. 1

RANGPUR COMMUNITY MEDICAL COLLEGE JOURNAL
(RCMC JOURNAL)

January 2025 | Vol. 8 | No. 1

Editorial

Vitamin B12: The Silent Guardian of Our Health

***Rahim MA[1]**

In today's health-conscious world, where super foods and supplements dominate headlines, it is easy to overlook the foundational nutrients that silently power our bodies. Among them, Vitamin B12—also known as cobalamin—stands as an unsung hero. Essential for red blood cell formation, neurological integrity, and DNA synthesis, Vitamin B12 is not just another vitamin; it is a cornerstone of our health and survival (National Institutes of Health [NIH], 2021).

The Unique Nature of B12

Vitamin B12 is structurally the most complex of all vitamins and is unique in another way: it is naturally found only in animal-based foods—meat, poultry, eggs, dairy, and fish. Unlike other B vitamins, our bodies cannot produce B12, and plant-based sources do not offer it in active form. This makes it especially challenging for vegetarians and vegans to meet their B12 needs without fortified foods or supplements (Pawlak et al., 2013).

The Hidden Crisis of Deficiency

Despite being required in microgram amounts, the impact of B12 deficiency is far from small. Early symptoms may appear mild—fatigue, irritability, poor concentration—but as deficiency progresses, individuals may suffer permanent neurological damage, balance disorders, peripheral neuropathy, and megaloblastic anemia (O'Leary & Samman, 2010).

Worryingly, many people may be deficient without knowing it. Older adults, due to reduced stomach acid production, often absorb less B12. Likewise, individuals with gastrointestinal conditions like Crohn's disease, celiac disease, or those who have had gastric bypass surgery, are at greater risk. Certain medications like metformin (commonly prescribed for diabetes) and proton pump inhibitors (used for acid reflux) can further reduce B12 absorption (Stabler, 2013).

Special Considerations for Pregnancy and Childhood Vitamin B12 deficiency during pregnancy can have devastating consequences. Research has linked maternal B12 deficiency to neural tube defects, low birth weight, and delayed cognitive development in infants (Koebnick et al., 2004). Infants born to B12-deficient mothers may appear healthy at birth but can develop symptoms such as developmental delays, poor growth, and failure to thrive within months.

Prevention and Public Awareness

The good news is that Vitamin B12 deficiency is entirely preventable and treatable. For those at risk, B12 supplements, either oral or injectable, are highly effective. Fortified plant-based foods (like cereals, nutritional yeast, and soy milk) provide vital alternatives for vegans.

However, the key lies in awareness and early screening. Many cases of deficiency go undetected due to vague symptoms and lack of routine testing. Healthcare providers should actively monitor B12 levels in high-risk groups and advise on supplementation where necessary.

Conclusion: A Call for Vigilance

In the pursuit of modern dietary trends and lifestyle changes, Vitamin B12 must not be neglected. As we ove toward more plant-based living and longer lifespans, the silent threat of B12 deficiency looms larger than ever. Let this vital nutrient receive the attention it deserves—not just in medical circles, but in homes, schools, and communities. It's time to make B12 awareness a public health priority.

References:

1. National Institutes of Health. (2021). Vitamin B12: Fact Sheet for Health Professionals. Office of Dietary Supplements. Retrieved from https://ods.od.nih.gov/factsheets/VitaminB12-HealthProfessional/

1. **Professor Dr. Md. Abdur Rahim**
Professor & Head Department of Biochemistry
Rangpur Community Medical College
Mobile: 01712-555502
E-mail: abdurrahim1967@gmail.com

For correspondence

2. Pawlak, R., Parrott, S. J., Raj, S., Cullum-Dugan, D., & Lucus, D. (2013). How prevalent is vitamin B12 deficiency among vegetarians? Nutrition Reviews, 71(2), 110–117. https://doi.org/10.1111/nure.12001

3. O'Leary, F., & Samman, S. (2010).Vitamin B12 in health and disease. Nutrients, 2(3), 299–316. https://doi.org/10.3390/nu2030299

4. Stabler, S. P. (2013).Clinical practice.Vitamin B12 deficiency. New England Journal of Medicine, 368(2), 149–160. https://doi.org/ 10.1056/ NEJMcp1113996

5. Koebnick, C., Hoffmann, I., Dagnelie, P. C., Heins, U. A., Wickramasinghe, S. N., Ratnayaka, I. D., & Leitzmann, C. (2004). Long-term ovo-lacto vegetarian diet impairs vitamin B-12 status in pregnant women. The Journal of Nutrition, 134(12), 3319–3326. https://doi.org/10.1093/jn/134.12.3319.

Original Article

Somatotype of Bangladeshi Male Subjects with Type 2 Diabetes Mellitus

***Reshma RA[1], Anwar S[2], Jannat A[3],Diluara K[4], Islam MS[5]**

Abstract:

Background: *The body physique of a person can be determined by anthropometric measurement & expressed as 3 number rating expressed as endomorphy, mesomorphy & ectomorphy which determines the somatotype of the individual. Diabetes Mellitus is a chronic metabolic disorder which have adverse effect of all functional system of body.*

Objective: *To assess the somatotypicvariation of male with type 2 diabetes mellitus by anthropometric technique.*

Material and Methods: *This cross-sectional, analytical study was conducted anthropometrically at Department of Anatomy of Rangpur Medical College from January 2021 to December 2021.50 cases of adult male patients suffering from T2DM for at least 1 year was selectedas diabetic. Another 50 adult healthy male subjects without DM served as control of the study. Subjects with sign of any chronic metabolic disorder was excluded from the study Their age range was between 21-60 years. Subscapular, supraspinal and triceps skin fold thickness was measured and endomorphic score was determined. Humerus and femur breadth, mid arm and calf circumference was measured and mesomorphic score was determined. Height, weight was measured; BMI was calculated and ectomorphic score was determined. These scores were compared between diabetic and control group.*

Results: *Mean somatotype score of diabetics was endomorphy 10.68; mesomorphy 10.86; ectomorphy 5.88. Mean somatotype score ofcontrols was endomorphy 7.16; mesomorphy 8.27; ectomorphy 2.14. All these scores (endo, meso & ectomorphic) were significantly higher in diabetics than controls. It was also observed thatmesomorphy was predominant in both control & diabetic. Where as in controls 94% were mesomorphy predominant but in diabetic mesomorphy was higher than endomorphy in 36% and endomorphy was higher than mesomorphy in another 36%; endomorphy & mesomorphy was similar in another 28%. This explains the Bangladeshi males are mesomorphic but in the diabetic males endomorphy tends to be predominant than mesomorphy. The differences in the ratings of the somatotype components were highly statistically significant ($p < 0.001$).*

Conclusions: *Though both group of males presented with higher mesomorphic score, but in diabetics endomorphy tends to be higher. Unlike the findings of studies in foreign countries presented markedly dominating endomorphy in diabetics. Higher mesomorphic score could be regarded as a characteristic feature of Bangladeshi male which tends to be endomorphic due to diabetics.*

Keywords: Type-2 diabetes mellitus, Somatotype, Males, Anthropometry, Endomorphy, Mesomorphy & ectomorphy.

1. **Dr. Rezwana Akhtar Reshma**
   Assistant Professor, Department of Anatomy
   Rangpur Community Medical College
   Email: asap.rashma@gmail.com
   Mobile: 01735823210
2. **Prof Dr. Selina Anwar**
   Professor & Head of Department of anatomy
   Rangpur Community Dental College
3. **Dr Arika Jannat**
   Assistant Professor, Department of Pharmacology & Therapeutics
   Rangpur Community Medical College
4. **Dr. Khadiza Diluara**
   Assistant Professor, Department of Biochemistry
   President Abdul Hamid Medical College, Kishoregonj
5. **Dr Mohammad Shariful Islam**
   Consultant, Department of Ophthalmology
   National Institute of Ophthalmology, Dhaka

For Correspondence

Introduction:

Diabetes mellitus is a disorder associated with the impairment of metabolism. It is increasingly becoming a public health problem as the incidence of the disease is rapidly rising, resulting eventually in disability and shortening of lifespan of patients. Currently estimates amount state that about 220 million people affected by the disease worldwide.[1] According to WHO global health days 2016, about 422 million people globally had diabetes, with most living in the developing countries, and unfortunately, more than 80% of diabetes deaths occur in low and middle-income countries.[2]

The prevalence of diabetes is increasing in Bangladesh in both urban and rural areas. A recent scoping review (1994-2013) revealed that the

prevalence of type 2 diabetes mellitus varied from 4.5% to 35.0% in Bangladesh. The International Diabetes Federation estimated that about 7.1 million people with diabetes in Bangladesh and almost an equal number with undetected diabetes. The number is estimated to double by 2025. Obesity, high BMI, sedentary lifestyle, physical inactivity, cigarette smoking, consumption of alcohol are the major risk factors for development of diabetes mellitus

Anthropometry is the technique of expressing quantitatively the form of the human body.[3] Somatotype is an effective technique for the study of anthropometric variations and body composition in subjects. The technique of somatotyping is a widely applied universal method of appraising body shape and structure. Somatotype was first invented by Sheldon et al[4] and later on revised by Carter and Heath.[5] According to Carter and Heath[6] "Somatotype calculation and analysis is a comprehensive, user-friendly noninvasive and non-laboriousprogram that has excellent input-output calculation, analysis and display features, making it the program of choice for anyone doing somatotype calculations and analysis."[7] Somatotype is expressed in a three-number rating representing endomorphy, mesomorphy and ectomorphy.

Endomorphy is the relative obesity of the individual.

Mesomorphy is the musculo-skeletal robustness.

Ectomorphy is the relative linearity or slenderness of a physique.

There is little information in the world literature about the correlation between somatotype and predisposition to various disease. As diabetic subjects are usually obese with high BMI, somatotype estimation by anthropometric measurements of these subjects may help in early diagnosis of disease. In Bangladesh no such study is still done to find a correlation between somatotype and type 2 diabetes. Therefore, aim in the present study was to determine the somatotype component of males with type 2 diabetes.

Materials and Methods:

This cross-sectional, analytical study was conducted anthropometrically at Department of Anatomy of Rangpur Medical College from January 2021 to December 2021. 50 cases of adult male patients suffering from T2DM for at least 1 year selected as diabetic and another 50 adult healthy male subjects without DM served as control of the study. The diabetic group was selected from Endocrinology Department of Rangpur Medical College Hospital and Diabetic Society and the control group was selected from stuff of Rangpur Medical College, Rangpur. Subjects with sign of any chronic metabolic disorder like coronary artery disease, renal disease, metabolic disorder, extreme obesity and any physical disability was excluded from the study and before selecting the control subjects, blood glucose level of each was checked to confirm the absence diabetes. Their age range was between 21-60 years. After full explanation, informed written consent was obtained from the subjects informing details of the purpose of the study.

The anthropometric examinations were carried out according to standard methods. All measurements were taken on the right side of the body to avoid variation. According to reference each measurement was done three times and mean of these three were taken. Measurements were taken in office time from9.00 am to 3.30 pm in day light. To avoid variations, same instruments were used throughout the study.During measurements of subjectsa male assistance was taken.

Following measurements were taken for determination of endomorphy, mesomorphy & ectomorphy respectively according to Carter and Heath. For determination of endomorphytriceps, subscapular, supraspinal skinfold thickness was measured. For determination of mesomorphybiepicondylarhumerus and femur breadth and mid arm and calf(maximum) circumference was measured.For determination of ectomorphy, Body mass index (BMI) or Height Weight Ratio (HWR) was calculated by measuring height and weight.

Somatotype was calculated according to the Heath-Carter Method, using the following equations.

Endomorphy = $-0.7182 + 0.1451(x) - 0.00068(x^2) + 0.0000014(x^3)$

Where x= (triceps skinfold + subscapular skinfold + supraspinal skin fold) multiplied by (170.18/height in cm)

Mesomorphy = 0.858 × humerus breadth + 0.601 × femur breadth + 0.188 × mid arm circumference + 0.161 × calf circumference – height × 0.131 + 4.5

Ectomorphy

Three different equations are used to calculate ectomorphy according to height-weight r(HWR) or Body Mass Index (BMI)

If HWR is greater than or equal to 40.75 then

Ectomorphy = HWR × 0.732 – 28.58

If HWR is less than 40.75 but greater than 38.25 then

Ectomorphy = HWR × 0.463 – 17.63

If HWR is equal to or less than 38.25 then

Ectomorphy = 0.1

After collecting the data, results were prepared in term of range, mean values, standard deviations (SD), percentage value etc. as applicable for each parameter. All the values of measurement and calculation were compared between diabetic and control groups by students unpaired "t" test. In all the statistical analysis the significance level was set as $p \leq 0.05$ at 95% confidence interval. The statistical analysis was carried out using the statistical package for social sciences (SPSS version 26.0). Then tables were used to explain the result.

Results:

Table-I shows the result of all the measurements in diabetic group and control group. It was observed that in endomorphy, subscapular, supraspinal and triceps skinfold thickness were significantly higher in diabetic group than control group; in case of mesomorphy, humerus breadth, femur breadth and mid arm and calf circumference were significantly higher in diabetic group than control group; again, in case of ectomorphy, height, weight and BMI were significantly higher in diabetic group than control group.

Table-I: Comparison of endomorphic, mesomorphic & ectomorphic score between control and diabetic group (n=50 in each group)

Variables	Control	Diabetic	p value
For endomorphy			
Subscapular skinfold thickness (cm)	3.48±0.25 (3.1-4.3)	4.50±0.42 (3.61-5.13)	0.000
Supraspinal skinfold thickness (cm)	4.56±0.26 (4.13-5.32)	5.49±0.40 (4.41-6.25)	0.000
Triceps skinfold thickness(cm)	2.44±0.29 (2.1-3.2)	3.43±0.44 (2.33-4.33)	0.000
For mesomorphy			
Humerus breadth (cm)	7.31±0.26 (6.8-7.9)	8.68±0.59 (7.1-10.4)	0.000
Femur breadth (cm)	8.45±0.26 (7.8-8.9)	9.96±0.63 (8.7-11.7)	0.000
Mid arm circumference (cm)	39.65±0.40 (39.1-40.9)	41.20±1.30 (36.3-43.35)	0.000
Calf circumference (cm)	42.48±0.29 (41.9-43.3)	43.80±1.17 (39.70-45.3)	0.000
For ectomorphy			
Height (m)	1.72± 0.38 (1.67-1.86)	1.74± 0.07 (1.65-1.87)	0.021
Weight (kg)	71.80± 3.52 (64-81)	80.00 ±4.65 (68-89)	0.000
BMI (kg/m2)	24.39±1.38 (21.19-29.03)	27.14±1.86 (22.97-30.8)	0.000

Results are shown as range and mean±SDs

In table-II and figure I, remainingsomatotypic score observed thatmesomorphy was predominant in both control & diabetic but diabetics tends to be endomorphic. The differences between the somatotype components were highly significant ($p < 0.001$).

Table-II: Comparison of Somatotype score (endomorphy, mesomorphy and ectomorphy) between control and diabetic group (n=50 in each group)

Variables	Control	Diabetic	p value
Endomorphy	7.16±0.85 (0.61-1.03)	10.68±1.29 (0.77-1.38)	0.000
Mesomorphy	8.27±0.46 (7.32-9.30)	10.86±1.17 (7.28-13.70)	0.000
Ectomorphy	2.14±1.36 (0.11-6.92)	5.88±1.71 (0.36-9.74)	0.000

Results are shown as range and mean±SDs

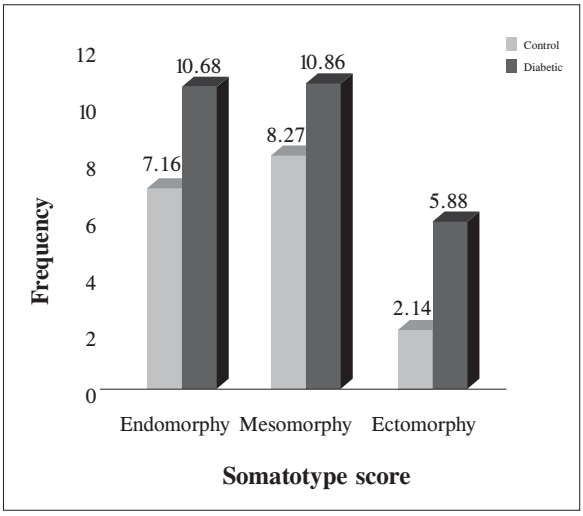

Figure-1: Bar diagram showing distribution of Somatotypic score between control and diabetic

In table-III percentage of endomorphic and mesomorphic score in control and diabetic shows in controls 94% were mesomorphy predominant but in diabetic mesomorphy was higher than endomorphy in 36% and endomorphy was higher than mesomorphy in another 36%; endomorphy & mesomorphy was similar in another 28%. This explains the Bangladeshi males are mesomorphic but in the diabetic males endomorphy tends to be predominant than mesomorphy. The differences in the ratings of the somatotype components were highly statistically significant ($p < 0.001$).

Table-III: Percentage of endomorphic and mesomorphic score in control and diabetic group (n=50 in each group)

Groups	Endomorphy predominant	Mesomorphy predominant	Equal endomorphy & mesomorphy
Control	6%(3)	94%(47)	_
Diabetic	36%(18)	36%(18)	28%(14)

Results are shown as range and mean±SDs

Discussion:

The human somatotype is expressed in three ratings representing endomorphy, mesomorphy, and ectomorophy.[8] Endomorphy reflects development of tissues with endodermal origin, relative domination of structures associated with digestion and assimilation, including fat deposition. Mesomorphy reflects development of human body structures with mesodermal origin, mostly bone and muscle systems. Ectomorphy reflects development of structures derived from ectoderm. In the world literature little analysis of somatotype characteristics of male patients with type 2 diabetes mellitus is available. Studies using the Heath-Carter somatotyping method have been conducted in Italy.[9] Endomorphy is dominant - 6.8, followed by mesomorphy - 5.6, and highly reduced ectomorphy - 0.6. The findings correspond with overall obesity, high BMI, high risk of coronary and metabolic diseases. Studies of male patients with type 2 diabetes mellitus using the same somatotypic method have been conducted in India.[10] The findings (7.2-4.9-0.7) also show uppermost rating of endomorphy, followed by mesomorphy and highly reduced ectomorphy. Another studies of male patients with type 2 diabetes mellitus using the same somatotypic method have been conducted in Bulgaria. The findings (5.88-4.14-1.64) it shows uppermost rating of mesomorphy, followed by endoomorphy and highly reduced ectomorphy.

In the present study in Bangladesh, somatotype of male patients with type 2 diabetes mellitus was performed by using the Heath-Carter methodand it shows mesomorphywas with the highest rating, followed by endomorphy and ectomorphy with the lowest rating like as Bulgaria. Unlike the findings of highest endomorphy ratings in studies conducted in other countries, our results show that mesomorphy is the dominant somatotype component in the Bangladeshi male control group. This can be regarded as a characteristic feature of Bangladeshimale. But in diabetic group though mesomorphy was higher but endomorphyalso tends to be higher may due to obesity, sedentary habit, food habit of these subjects. These habits could be prevented by change in life style to overcome this life threating disease.

Conclusions:

The Bangladeshi male diabetics have a tendency to be endomorphic than theirmesomophicpredominance in control. So, it explains male were mesomorphic by nature but the diabetic male was turned into endomorphic due to this disease. For development of Diabetes mellitus, endomorphism was the first and main key factor. Endomorphism was the beginning of all coronary, chronic and metabolic diseases. It was an alarming sign for a healthy individual and everyone must be aware of this condition.

References:

1. Baltadjiev AG. 'Somatotype characteristics of male patients with type 2 Diabetes mellitus' Folia Medica. 2012; 54 (2); 40-45.
2. MohiuddinAk. 'Diabetes Fact: Bangladesh Perspective' International Journal of Diabetes'. 2019; 2 (1); 14-20.
3. Krishan K. 'Anthropometry in Forensic medicine and forensic science-Forensic Anthropometry' The internet journal of Forensic Science. 2007; 2 (1).
4. Sheldon, WH, Stevens, SS, and Tucker, WB. 'The varieties of human physique' Harper. 1940. (https://www.apa.org)
5. Carter JEL. 'The Health-Carter Anthropometric Somatotype' Somatotype Instruction Manual, San Diego State University, San Diego, USA. 2002; 92182-72519.
6. Carter JEL and Heath BH. 'Somatotyping Development and Application' Cambridge University press.1990.

7. Alekseeva VA, Gureyeva AB, Borisova NV, Sydykova LA, Petrova PG, Osinskaya AA. 'Somatotypological characteristics of Adult women with T2D in Yakutia', International Journal of Biomedicine. 2019; 9 (4); 320-323.
8. Koleva M, Nacheva M, Boev M. 'Somatotype and disease prevalence in adults', Rev Environ Health. 2002; 1 (17); 65-84.
9. Buffa R, Floris G, Putzu PF, Carboni L, Martini E. 'Somatotype in Elderly Type 2 Diabetes patients' Coll. Antropol. 2007; 31 (3); 733-737.
10. Herrera H, Rebato E, Hernandez R. Relationship between somatotype and blood pressure in a group of institutionalized Venezuelian elders. Gerontology 2004;50 (4); 223-9

Original Article

Effects of Areca Nut on Serum Albumin and Bilirubin Level in Areca Nut Chewers

*Tania MF[1], Sarker CR[2], Siraj S[3], Haque MR[4], Mashrur S[5]

Abstract:

Background: *Areca nut chewing is a common social tradition in many regions of the world particularly in Southeast Asia. It is one of the addictive substances that have toxic manifestations in immune, hepatic and other defense systems.*

Objectives*: To assess the effects of areca nut on liver function status (serum albumin and bilirubin level) in areca nut chewers.*

Materials and Methods: *This cross-sectional analytical study was conducted in department of Physiology, Rangpur Medical College, Rangpur from July 2022 to june 2023. Total number of 200, age range from 30 to 45 years were selected after satisfactory inclusion and exclusion criteria. They were divided into two groups. Group A- 100 areca nut chewers, Group B-100 non areca nut chewers. Their liver function status was studied by measuring serum albumin and bilirubin levels. For statistical analysis data were analyzed by one way Anova test and level of significance p0.5,was performed by computer based software SPSS-25.0 version for windows. P value ≤ 0.05 was accepted as level of significance. Ethical consideration was achieving by taking an informed written consent after briefing about objectives of the study. Quality was assured through avoidance of missed data, filling of code, regular entry of data and careful data analysis.*

Results: *Mean serum albumin level was significantly ($p < 0.001$) lower, mean serum bilirubin was significantly ($p < 0.001$) lower in areca nut chewers than non areca nut chewers.*

Conclusion: *The decreased serum albumin and bilirubin levels in areca nut chewers is evidence of development of hepatic disorders due to areca nut consumption.*

Keywords: Serum albumin, Serum bilirubin, Areca nut chewers

1. **Dr. Most. Fahmida Tania**
   Assistant Professor, Department of Physiology
   Rangpur Community Medical College
   Rangpur, Bangladesh
   Mobile: 01754393554
   Email: fahmidalinu83@gmail.com
2. **Prof. Dr. Chandra Rani Sarker**
   Professor and Head, Department of Physiology
   Rangpur Medical College
3. **Dr. Sayada Siraj**
   Associate Professor, Department of Physiology
   Rangpur Medical College
4. **Prof. Dr. Md. Rashedul Haque**
   Professor and Head, Department of Biochemistry
   Rangpur Medical College
5. **Dr. Sabrina Mashrur**
   Assistant Professor, Department of Physiology
   Rangpur Community Medical College

For Correspondence

Introduction:

Areca nut chewing is a habit of great antiquity. The word "Areca" is derived from the Malay word adakka (areca nut) or from adakeya, the Indian equivalent[1]. Areca nut is the fourth most commonly used social drug, ranking after nicotine, ethanol and caffeine[2-4].

Areca nut (AN) chewing is common in 10% to 20% of the world population[5,6]. It is estimated that about 600 million people chew various types of areca nut worldwide, predominantly in the countries of South and Southeast Asia[4,5]. Its consumption causes many harmful effects on the human body due to presence of alkaloids in it[8]. These effects of the alkaloids of AN are not only limited to the oral cavity where it comes in to direct contact but may also affect various organs in response to its breakdown and excretion products. Liver is the one among them susceptible to AN induced damage[7].

The areca nut palm (areca catechu) is cultivated

mainly in India, Malaysia, Polynesia, Micronesia and most places in the South Pacific Islands. The current production of areca nut in the world is about 0.613 million tonnes from an area of 0.476 million hectares. India ranks first in area 58% and production 53% of areca nut[3].

Areca catechu has been found to contain mineral, fiber, 50%-60% sugars, 15% lipids (glyceride of lauric, myristic and oleic acid), 15% condensed tannins (phlobatannin and catechin), polyphenolics (flavonoids and tannin), and 0.2% - 0.3% alkaloids[2].

Areca catechu contains four areca alkaloids primarily arecoline, along with arecaidinegavacine and guvacoline.[3,8-10] Arecoline (methyl 1-methyl-3, 6-dihydro-2H-pyridine-5-carboxylate) acts as an agonist primarily at muscarinic acetylcoline receptors and stimulate the central and autonomic nervous system. This leads to subjective effects of increased well-being alertness and stamina. It is known to improve concentration and relaxation with other reported effects including lifting of mood and cariostatic property.[3,4] It also exerts a direct antimicrobial effect against bacteria, including streptococcus mutans, streptococcus salivarius and various other microorganisms in the oral cavity Arecaidine may have anxiolytic properties through inhibition of gamma amino butyric acid (GABA) reuptake.[3,9,10]

Despite these general effects, the adverse effects have outweighed them. Several studies have shown that, areca nut chewing is associated with increased risk for various medical conditions including liver cirrhosis, hepatocellular carcinoma, hyperlipidemia, coronary artery disease, hypertension, type 2 diabetes mellitus (DM), oral cancers [3,,8,11,12].

Arecoline, the main areca alkaloid of the areca nut is reported to have cytotoxic, genotoxic and mutagenic effects in various cells[2-4] Areca nut (arecoline) with or without added tobacco was classified as a group one carcinogen by WHO and International Agency for Research on Cancer (IARC). There is evidence that areca nut without added tobacco causes hepatocelullar carcinoma (HCC)[3-5].

The liver is an organ of paramount importance, as it plays an essential role in maintaining the biological equilibrium[5]. The spectrum of liver function includes metabolism of lipid, carbohydrate, protein, vitamins and regulation of blood coagulation. Estimation of enzymes, specific to the hepatic system give an assessment of its cellular integrity and functionality by liver function tests[13].

Areca alkaloids produce nitrosamine derivatives which have potential carcinogenic effects[5]. It is stated that, the substance present in areca nut increase release of inflammatory mediators including reactive oxygen species, C-reactive protein and tumor necrosis factor-alpha (TNF-alpha), which are risk factors for hepatocellular carcinoma[14].

Studies from the United States of America (USA) and the United Kingdom (U.K), where the South Asian community is large and rapidly growing have shown that areca nut are readily available and commonly used in ethnic enclaves[2,4]. In the USA, this product is legal and inexpensive, thus 20% to 60% of Asian Americans use areca nut. It's use is very uncommon among the other racial groups[14]

The independent and interactive roles of habitual areca nut chewing and other known risk factors for biochemical dysfunction and cirrhosis of the liver is illustrated in this study. Therefore, It was conducted to examine the liver function tests among areca nut chewers. This study serves as a good tool in encouraging people not only to quit smoking and alcohol drinking but to also quit areca nut chewing, in order to reduce their chances of developing cirrhosis. There is a need for further studies to re-investigate this association.

Materials and methods:

This comparative study was performed in Department of Physiology, Rangpur Medical College from July 2022 to June 2023. A total of 200 people were selected through convenient sampling from age 30 t0 45 years. The research only included 100 areca nut chewers and 100 non areca nut chewers. The studys subjects provided signed, informed consent. Following the random number table approach, two groups were created. Group A – 100 areca nut chewers. And Group B – 100 non areca nut chewers. The patients were assessed using a questionnaire, a clinical examination and biochemical analysis. The standard datasheet suggested for the current research contains all the information, including patient details, clinical assessment and biochemical investigations. To provide a comparison study between areca nut chewers and non areca nut chewers, results were compared and summarized. One way Anova test was applied to compare the significant differences regarding efficacy of both groups using SPSS 25 version. Level of significance is p0.5.

Results:

Mean±SD of serum albumin values were 2.77±0.805 and 4.49±0.522 gm/dl in group A and B respectively.In this study, the mean serum albumin level was significantly decreased ($p < 0.001$) in areca nut chewer subjects than those of non areca nut chewers. Mean ± SD of serum bilirubin levels were 0.353 ± 0.130 and 0.543 ± 0.187 mg/dl in group A and B respectively.the mean serum bilirubin level was significantly decreased ($p < 0.001$) in areca nut chewer subjects than those of non areca nut chewers.

Table-I: Showing statistical analysis of mean ± SD of serum albumin, serum bilirubin level of the study subjects in different groups

Group	Serum albumin (gm/dl) Mean ± SD Range (L-H)	Serum bilirubin (mg/d)l Mean ± SD Range (L-H)
A (n=100)	2.77±0.805 (2.0-5.0)	0.26±0.449 (0.0-1.0)
B (n=100)	4.49±0.522 (3.0-5.0)	0.51±0.482 (0.0-1.0)

Table-II: Showing statistical analysis of mean ± SD of serum albumin levels of the study subjects in different groups.

Group	Mean ± SD gm/dl Range (L-H) gm/dl	P value
A/B (n=100)/ (n=100)	2.77±0.805/4.49±0.522 (2.0-5.0) / (3.0-5.0)	.000***

Table-III: Showing statistical analysis of mean ± SD of serum bilirubin levels of the study subjects in different groups.

Group	Mean ± SD gm/dl Range (L-H) gm/dl	P value
A/B (n=100)/ (n=100)	0.353±0.130 / 0.543±0.187 (0.0-1.0) / (0.0-1.0)	.000***

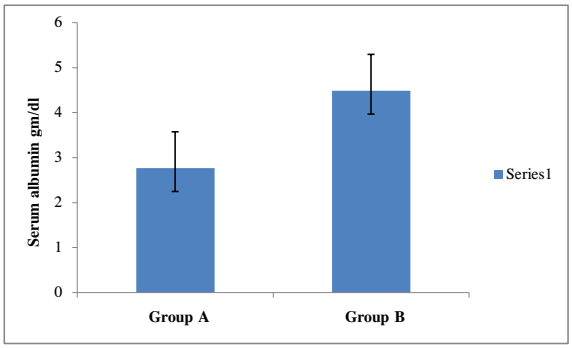

Figure-1: Bar diagram showing mean (±SD) serum albumin levels in group A (experimental) and group B (control)

Vertical line indicates standard deviation.

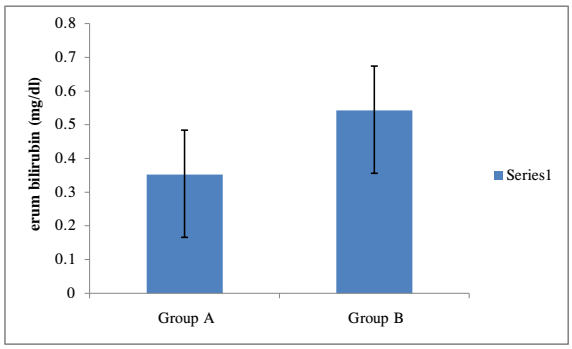

Figure-2: Bar diagram showing mean (±SD) serum biirubin levels in group A (experimental) and group B (control)

***** Vertical line indicates standard deviation.

Discussion:

In this study, the mean serum albumin level was significantly decreased ($p < 0.001$) in areca nut chewer subjects than those of non areca nut chewers. These findings are in agreement with those reported by Satsangi S and Chawla YK[2], Bleibel W and Saleem S[4], Singroha K and Kamath VV,[8]Garg A, Chaturvedi P and Gupta PC[11,] Khashage SD, Juneja S and Bhowate RR[15]Chen X, He Y and Deng Y[16] and Shafique K et al[17]Satsangi S and Chawla YK[2]reported that serum albumin level is decreased in areca nut chewers than those of non areca nut chewers might be due to areca nut contain hepatotoxic agent cause intoxication of liver may be lead to impairment of liver functions and reduces protein production efficiency of liver. So, albumin level is decreased in areca nut chewers. Bleibel W and Saleem S[4] studied that arecoline (main component of areca nut) increased oxidative damage of liver cell by free radicles and produced oxidants. Albumin has antioxidant properties through binding

to copper ions and scavenging HOCL. Then the oxidized albumin may be cleared rapidly on the circulation and degraded. So, there is decreased albumin level in serum. Singroha K and Kamath VV[8]suggested that areca nut contains hepatotoxic substances including arecoline, reactive oxygen species (ROS) such as super oxide anions, hydroxyl radicles, hydrogen per oxide and HOCL can damage cellular constituents leading to inflammation and injury of the liver might be lead to decreased synthesis of albumin in areca nut chewers. Garg A, Chaturvedi P and Gupta PC[11]observed that long term usage of areca nut is the potential generators of free radicles. The highly reactive radicles and reactive oxygen species can act as initiators of carcinogenesis. Khashage SD, Juneja S and Bhowate RR[15]suggested that main component of areca nut arecoline causes DNA damage , activate pro carcinogens and alter the cellular antioxidant defense system. It causes oxidative stress which might lead to oxidative damage. Albumin help to reduce oxidative damage by scavenging free radicles and by detoxifying the oxidants.Chen X, He Y and Deng Y[16] reported that albumin has antioxidant properties through binding to copper ions and scavenging HOCL. Then the oxidized albumin may be cleared rapidly from the circulation and degraded. So, there is decreased albumin level in serum. Shafique K et al[17]said that, albumin is a negative acute phase protein and acts as a marker of inflammation. The amount of albumin is decreased by cytokines IL- 1, IL- 6 and TNF- a during the acute phase response.

In this study, the mean serum bilirubin level was significantly decreased ($p < 0.001$) in areca nut chewer subjects than those of non areca nut chewers. These findings are in agreement with those reported by Jeng JE et al[5], Sen S, Talukder G and Sharma A[12], LanTY et al[13] and Boucher B &Mannan N[14]. Jeng JE et al[5] reported that several metabolites reflecting antioxidant capacity were significantly altered in chronic areca nut chewers. In one antioxidant system an increase in heam degradation by haemoxygenase (HO-1),tobiliverdin and bilirubin, a protective anti inflammatory response to increased oxidative stress. Bilirubin might be acts as an antioxidant and reduces free radicles produced by areca nut. Plasma metabolic profile showed increased level of heme and decreased level of bilirubin and biliverdin indicating a possible impairment of heme degradation pathway.Sen S, Talukder G and Sharma A[12] suggested that areca nut chewers have high level of arecoline and nitrosamine and experienced lower level of oxidative stress. Bilirubin acts as an antioxidant help to reduce oxidative stress. So, there is decreased level of serum bilirubin in areca nut chewers than control group.Lan TY et al[13] and Boucher B &Mannan N[14] observed that areca nut chewing is associated with increased oxidative stress and produce free radicles. Bilirubin might plays as an anti oxidant in reducing free radicles and their level is decreased in plasma.

Conclusion:

The present study has been designed to estimate the serum albumin and serum bilirubin levels in total number of 200 apparently healthy subjects aged 30-45 years. Among them 100 were apparently healthy subjects of areca nut chewer and 100 were apparently healthy subjects of non areca nut chewer. Results of the study may conclude that liver functions are altered in areca nut chewers as evidenced by significantly ($p < 0.001$) lower level of albumin and lower level of bilirubin in areca nut chewers as compared with healthy control subjects. The possible mechanism involved for the decreased level of serum albumin in areca nut chewer may be due to areca nut contain hepatotoxic agent causes intoxication of liver may be lead to impairment of liver functions and reduces protein production efficiency of liver. So, increased oxidative damage of liver cell by free radicles and oxidants produced by areca nut chewing.. The decreased level of serum bilirubin in areca nut chewers may be due to the overconsumption of bilirubin by free radicles produced by areca nut chewing. In this study the lower serum albumin and bilirubin levels in areca nut chewers may be due to consumption of areca nut for a prolonged period of time which induced sustained rise of blood arecoline levels. Reduction in areca nut consumption improves hepatic disorders and reduces mortality and morbidity in areca nut chewers.

References:

1. Ahuja SC, Ahuja U. Betel leaf and betel nut in India: history and uses. Asian agri-history 2011;15(1):13-35.
2. Satsangi S, Chawla YK. Viral hepatitis: Indian scenario. Med J Armed Forces Indian 2016;72:204-210.
3. Chandak RM, Chandak MG, Rawlani SM. Current concepts about areca nut chewing. J contemp dent 2013;3(2):78-81.
4. Bleibel W, Saleem S. Betel chewing and nonalcoholic steatohepatitis. Cureus 2018;10(7):01-05.
5. Jeng JE, Tsai MF, Tsai HR et al. Impact of

chronic hepatitis B and C related to betel quid chewing 2014;15(.2):637-642.
6. Norton SA. Betel: consumption and consequences. Journal of the American academy of dermatology 1998;38(1):81-88.
7. Gupta PC, Ray CS. Epidemiology of betel-quid usage Ann acad med Singapore .2004;33:31-36.
8. Singroha K, Kamath VV. Liver function tests as a measure of hepatotoxicity in areca nut chewers. J dent res rev 2016;3:60-64.
9. Lee CH, Ko AM, Warnakulasuriya S et al. Intercountryprevalences and practices of betel-quid use in south, southeast and eastern Asia regions and associated oral preneoplastic disorders. Evid based complement alternate med 2011;29:741-751.
10. Prabhu RV, Prabhu V, Chatra L, Shenai P, Suvarna N, Dandeken S. Areca nut and its role in oral submucous fibrosis. J clinexp dent 2014;6:569-575.
11. Garg A, Chaturvedi P, Gupta PC. A review of the systemic adverse effects of areca nut or betel nut. Indian j med paediatroncol 2014;35:3-9.
12. Sen S, Talukder G, Sharma A. Betel cytotoxicity. Journal of ethnopharmacology 1989;26(3):217-247.
13. Ian IY, Chang WC, Isai YJ, Chuang YI. Areca nut chewing and mortality in an elderly cohort study. American journal of epidemiology 2007;165:677-683.
14. Boucher B, Mannan N. Metabolic effects of the consumption of areca catechu. Addict Biol 2002.;7:103-110.
15. Khasbage SD, Juneja S, Bhowate RR. Association of areca nut habit with diabetes mellitus and liver toxicity. J dattamegheinst med sciuniv 2021;16:720-723.
16. Chen X, He Y, Deng Y. Chemical composition pharmacological and toxicological effects of betel nut. Evid based complement alternate med 2021;18:1-7.
17. Shafique et al. Areca nut chewing and systemic inflammation evidence of a common pathway for systemic diseases. Journal of inflammation 2012;9:22.

Original Article

The Spectrum of Histomorphological Patterns on Endoscopic Biopsy in Patients with Upper Gastrointestinal Tract Disorders

***Rahman MA[1], Siddika ST[2], Siddika SS[3], Mondal NT[4]**

Abstract:

Background: *Diseases of the upper gastrointestinal tract (GIT) are a major cause of morbidity and mortality. Endoscopic biopsy followed by histopathological examination is the gold standard for the diagnosis of these lesions.*

Objective: *To determine the spectrum of histomorphological patterns of upper GIT endoscopic biopsies.*

Materials and Methods: *This retrospective study was conducted in the Department of Pathology at Enam Medical College and Hospital, Savar, Dhaka, Bangladesh during a 3-year period from January 2020 to December 2022. The biopsy specimens received were fixed in 10% formalin and routinely processed in Hematoxylin & Eosin stain. Special stains like Giemsa and PAS staining were done in certain cases.*

Results: *A total of 235 endoscopic biopsies were studied. Male patients were 133 (56.6%) and female patients were 102 (43.4%) with M: Fratio 1.3:1. The age of the patients ranged from 13 to 85 years with the mean age 52.3 years. Most of the cases were between 51-60 years of age (28.1%). Stomach was the most frequent site (63.8%) followed by esophagus (17.9%), duodenum (17.4%) and gastro-esophageal junction (0.9%). Non-neoplastic cases were 115 (48.9%) and neoplastic cases were 120 (51.1%). The overall diagnostic findings showed malignancies 117 (49.8%) cases, followed by chronic inflammation 58 (24.7%) and hyperplastic polyp 29 (12.3%) cases.*

Conclusion: *For any suspicious lesions in upper GIT, endoscopy followed by histopathological examination should be done for early diagnosis as well as management.*

Keywords: Endoscopic biopsy, Gastrointestinal tract, Histomorphology, Hyperplastic polyp, Malignancy

Introduction:

The gastrointestinal (GI) tract is a hollow tube extending from the oral cavity to the anus that consists of anatomically distinct segments including the esophagus, stomach, small intestine, colon, rectum, and anus.[1] The upper GIT extents from esophagus to duodenum (second part).

Upper GI disorders are one of the most commonly encountered problems in clinical practice with high degree of morbidity and mortality. A wide variety of infections, inflammatory disorders, vascular disorders, mechanical conditions, toxic and physical reactions, including radiation injury and neoplasms may occur in the GIT.[2] Dietary, environmental, geographic, and genetic factors are some of the key reasons contributing to the prevalence of these condition.[3]

Patients present with varied symptoms such as dyspepsia, dysphagia, nausea, vomiting and loss of weight. The disease burden is known to affect the quality of life, which has effects on health care costs. There are several diagnostic investigations available in the evaluation of these symptoms where endoscopy is performed as the initial diagnostic test. Currently Upper GIT endoscopy is regarded as an established modality of investigation as well as treatment for most patients with upper GI symptoms.

1. **Dr. Md. Atiqur Rahman**
   Professor, Department of Pathology
   Enam Medical College, Dhaka
   Email: mdatiq07@gmail.com
   Mobile: 01734-713708
2. **Dr. Syeda Tasfia Siddika**
   Associate Professor, Department of Physiology
   Mugda Medical College, Dhaka
3. **Dr. Syeda Subrina Siddika**
   Lecturer, Department of Community Medicine
   Mugda Medical College, Dhaka
4. **Dr. Nelson Taposh Mondal**
   Associate Professor, Department of Medicine
   Enam Medical College & Hospital, Dhaka

****For Correspondence***

It is a simple, safe and well tolerated procedure with direct visualization of the pathologic site and biopsy leading to early detection of non-neoplastic and neoplastic pathologic conditions and therefore helps to start appropriate treatment.

It generates biopsies from the sites that were previously inaccessible, without the major resection. It helps to detect cancers or their premalignant stages and explores H. Pylori and gastric mucosal lesions like intestinal metaplasia and dysplasia which may progress to invasive cancer. It is used also for monitoring the course, extent and severity of a disease, response of the therapy and early detection of complications. This is reflected by the rising trend in obtaining mucosal biopsies from the upper GIT. Endoscopic biopsy examination followed by histopathologic assessment is a convenient procedure and current gold standard for accurate objective assessment of patients with upper GIT symptoms.[4]

The present study was done to assess the histopathological spectrum of various upper GIT lesions with respect to clinical and endoscopic findings and to find out their frequency of occurrence in relation to age and sex.

Materials and Methods:

This was a retrospective study conducted for a period of three years from January 2020 to December 2022 in the Department of Pathology at Enam Medical College and Hospital, Savar, Dhaka, Bangladesh. The present study included 235 endoscopic biopsies.

Inclusion criteria: All endoscopic mucosal biopsies of esophageal, gastric and duodenal (1st part and 2nd part) lesions.

Exclusion criteria:

1. Inadequate biopsies
2. Patients presenting with lesions in the oral cavity and pharynx
3. Patients presenting with lesions beyond the second part of duodenum

The patient details like age, sex, presenting complaints, clinical findings and endoscopic findings were obtained from the requisition form that was sent along with biopsy samples. In all the cases 10% formalin was used as fixative. Histopathological examination was carried out after conventional paraffin section followed by H&E staining. In certain cases, special stain like Giemsa and PAS staining was done.

Results:

Out of 235 upper GIT endoscopic biopsy samples, 150 (63.8%) were from the stomach, 42 (17.9%) from esophagus, 41 (17.4%) from duodenum and two (0.9%) from gastro-esophageal junction as depicted in Table-I.

Table-I: Histomorphological patterns of upper GIT endoscopic biopsies according to site

Pathological Lesions		Esophagus	GEJ	Stomach	Duodenum	Total (%)
Non-Neoplastic						115(48.9)
Chronic inflammation		2		28	28	58(24.7)
Erosive gastritis				2		2(0.9)
Eosinophilic gastritis				2		2(0.9)
Ulcer		3		12	4	19(8.1)
Barrett esophagus		2				2(0.9)
Polyp		1		27	1	29(12.3)
Dysplasia		1				1(0.4)
Non-specific		2				2(0.9)
Neoplastic						120(51.1)
Benign 3(1.3%)	Squamous Papilloma	1				1(0.4)
	Adenoma			1	1	2(0.9)
Malignant 117(49.8%)	SCC	21				21(8.9)
	AC	9	2	74	7	92(39.1)
	NHL			4		4(1.7)
	Total	42(17.9)	2(0.9)	150(63.8)	41 (17.4)	235

GEJ- Gastro-esophageal junction; SCC- Squamous cell carcinoma; AC- Adenocarcinoma; NHL- non-Hodgkin lymphoma

Table-II: Distribution of upper GI endoscopic biopsies according to age and gender

Age in years	Esophagus		GEJ		Stomach		Duodenum		Total	Percentage
	Male	Female	Male	Female	Male	Female	Male	Female		
< 21	-	-	-	-	2	-	1	3	6	2.6
21 to 30	2	-	-	-	1	7	5	3	18	7.6
31 to 40	3	-	-	-	11	10	4	2	30	12.8
41 to 50	3	4		-	19	21	3	4	54	22.9
51 to 60	11	6		2	23	17	6	1	66	28.1
61 to 70	8	3			16	11	2	3	43	18.3
> 71	2	-	-	-	8	4	3	1	18	7.7

The age of the study population ranges from 13 to 85 years with the mean age 52.3 years. Most of the cases were between 51-60 years of age (28.1%), followed by 41-50 years age (22.9%) and the majority of the patients were between 41 to 70 years (69.4%). Age >71 years had 18 (7.7%) patients, whereas age <21 years were 06 (2.6%) patients making them the least common age groups (Table-II). Males were 133 (56.6%) and females were 102 (43.4%). The male: female ratio 1.3:1.

Patients presented with dyspepsia, abdominal pain, dysphagia, vomiting, anemia, anorexia, melena etc., of which dyspepsia was the common presenting feature (46.15%).

Non-neoplastic cases were 115 (48.9%) and neoplastic cases were 120 (51.1%), of which 117 (97.5%) were malignant. Among the malignancies, the common sites of malignancy were stomach in 78 (66.7%), followed by esophagus 30 (25.6%), duodenum 07 (6%) and gastro-esophageal junction 02 (1.7%) cases. Adenocarcinoma 92 (78.6%) was the most common malignant lesion. Among the overall diagnostic findings 117 (49.8%) were malignant, followed by chronic inflammation 58 (24.7) and hyperplastic polyp 29 (12.3%) as shown in Table-I.

Discussion:

The present study was done on 235 patients to assess the histomorphological spectrum of various upper GIT lesions with respect to clinical and endoscopic findings and to find out their frequency of occurrence in relation to age and sex. Good clinical and endoscopy information are fundamental part of adequacy and this strongly affects how a biopsy should be read. However, the precise diagnosis becomes more certain on histopathological examination.

The most common site for biopsy was stomach 150 (63.8%), followed by esophagus 42 (17.9%), duodenum 41 (17.4%) and two (0.9%) from gastro-esophageal junction. This is similar to other studies.[2,4-8] Nazrin et al. found endoscopic biopsies from stomach 61 (45.18%), esophagus 53 (39.25%), duodenum 15 (11.12%) and gastro-esophageal junction 6 (4.45%) cases.[5] Contrasting patterns found by Anjana et al.[9] and Sharma et al.[10] where esophageal biopsies comprised the majority of the cases (63% and 49.54 respectively). Parikh et al. foundthe duodenal biopsy was the next common site to be sampled after the gastric biopsy samples, which is in contrast with most other studies.[11]

The age of the study population ranges from 13 to 85 with the mean age 52.27 years. Hirachand et al.[12] and Nazrin et al.[5] found mean age at 52 years and 53.2 years respectively, which are similar to this study. Parikh et al. found a mean age of 42 years in their study.[11] In the present study, most of the cases were between 51-60 years of age (28.1%) which is comparable to other studies.[2,5,8]Kambale et al.[6]and Theresa et al.[13] found commonest age group was 31-40 years. Whereas, Hirachand et al. found the maximum patients were in the age group 41-50 years.[12] Differences in the age group dominance can be explained due to geographical, cultural and ethnic diversity.

Out of 235 patients, 133 (56.6%) were males and 102 (43.4%) were females with male: female ratio 1.3:1. Male predominance was also observed in other studies.[2,4,5,8] Theresa et al.[13] found 87 male patients and 65 female patients with M:F ratio 1.33:1. Qureshi et al.[14] found 465 male and 428 female patients and M:F ratio 1.04:1. The gender ratio favoring males could be reflective of the fact that males are exposed to more risk factors than females.

In our study dyspepsia was the commonest clinical presentation (46.15%) followed by abdominal pain and dysphagia. This is concordant to the studies of Nazrin et al.[5] Whereas, Anjana et al.[9] and Qureshi et

al.[14] found dysphagia was the common presenting feature; Mohan et al.[7] found majority of the patients (56%) presented with abdominal pain followed by dyspepsia and dysphagia.

We observed 48.9% non-neoplastic lesions and 50.9% were neoplastic lesions. This is comparable with the study of Mohan et al. who found 48.1% non-neoplastic and 51.8% neoplastic lesions.[7] Nazrin et al. reported 44.4 % of non-neoplastic and 55.6% neoplastic lesions.[5] In contrast to our study, Kambale et al.[6], Anjana et al.[9] and Parikh et al.[11] reported a greater number of non-neoplastic than neoplastic lesions. These differences in the results may be due to genetic, environmental, personal and nutritional factors in an individual. Among the malignancies, the common sites were stomach (66.7%), followed by esophagus (25.6%), duodenum (6%) and gastro-esophageal junction (1.7%). This was comparable with Rashmi et al.[2] and Mohan et al.[7]

Among the esophageal lesions, Kambale et al.[6] found 60% cases were non-neoplastic and 40% were neoplastic lesions. In the present study, we found 26.2% non-neoplastic, 73.8% neoplastic lesions and 71.4% are malignant. Nazrin et al. also found 15.02% non-neoplastic and 84.92% neoplastic lesions.[5] Gumber et al.[2] and Anjana et al.[9] also reported more neoplastic than non-neoplastic lesions. Among the malignant lesions, we found 70% squamous cell carcinoma and 30% adenocarcinoma. Squamous cell carcinoma was the most common malignancy diagnosed in the esophagus also found in others.[2,5,7,10] However, Sarker et al.[8] and Qureshi et al.[14] found adenocarcinoma in 50% and 70.2% cases respectively among the esophageal cancers. Although incidence of adenocarcinoma is more in western countries but in developing countries like ours, the incidence of squamous cell carcinoma is high because of attributable risk factors like tobacco, alcohol, smoking, poor oral hygiene and low socioeconomic status.

This study of gastric biopsy reveals 18.7% were chronic gastritis of different grades, 52% were malignant lesions, and 49.3% were adenocarcinoma. Similar study conducted by Sarker et al. found 21.3% were gastritis and 63% were malignant lesions.[8] Bhargavi et al.[7] and Sharma et al.[10] found malignancies 56.3% and 40% respectively. Gumber et al. found gastric carcinoma 29% cases and chronic gastritis 56.5% cases.[2] Duodenal biopsy reveals chronic duodenitis were 68.3% and malignancies were 19.5%. Our result is similar to a study done by Kambale et al. wherein 69.7% cases were chronic duodenitis and 6.1% cases were neoplastic lesions.[6]

Conclusion:

In the present study, we observed more neoplastic than non-neoplastic cases. Stomach was the commonest site of endoscopic biopsies. Gastritis of different gradeswas the most common non-neoplastic lesion of the stomach. Adenocarcinoma was the commonest neoplastic lesion of the stomach. Endoscopy followed by histopathological examination is necessary for early diagnosis and management of the upper GIT lesions.

References:

1. Turner JR. The Gastrointestinal Tract. In: Robbins and Cotran pathologic basis of disease. 10thedn. Kumar V, Abbas AK, Aster JC, Turner JR (eds). Philadelphia: Elsevier; 2021: 753-822.
2. Rashmi K, Horakerappa MS, Karar A, Mangala G. A study on histopathological spectrum of upper gastrointestinal tract endoscopic biopsies. Int J Med Res Health Sci 2013; 2(3): 418-424.
3. Goldblum JR. Esophagus. In: Rosai and Ackerman's Surgical Pathology. 11thedn. Goldblum JR, Lamps LW, Mckenney JK, Myers JL (eds). Philadelphia: Elsevier; 2018: 502-527.
4. Gumber R and Mulay SS. Endoscopic biopsy interpretation of upper gastrointestinal pathologies. International Journal of Scientific Research (IJSR) 2016; 5(10): 20-24.
5. Nazrin MS, Ferdous NE, Saha M and Rabbi FI. Histopathological study of upper gastrointestinal tract endoscopic biopsies. J Curr Adv Med Res 2019;6(1):42-46.
6. Kambale T, Khan R, Sawaimul KD, et al. Histopathological spectrum of upper gastrointestinal tract endoscopic biopsies. Indian J Forensic Med Pathol 2022; 15(2): 111-119.
7. Bhargavi M, Manjunath HK, Geethamani V, et al. Histomorphological analysis of upper gastrointestinal endoscopic biopsies - a retrospective study of 106 cases. Nat J Lab Med 2019; 8(4): 4-7.
8. Sarker MMR, Farooq MS, Uddin KS, Islam ASMA, Ali MZ. Pattern of upper GlT lesions diagnosed by histopathological examination of endoscopic biopsies in a rural tertiary hospital. KYAMC Journal 2018; 9(1): 20-23.
9. Anjana ML and Yevoor K. Histopathological spectrum of upper gastrointestinal endoscopic biopsies in a tertiary care centre. Annals of Pathology and Laboratory Medicine 2021; 8(6): 158-163.
10. Sharma S, Agarwal L, Rai NN, Agrawal MM. Histopathological spectrum of upper gastrointestinal

lesion detected by endoscopy guided biopsy- a single institute experience. IP Arch Cytol Histopathol Res 2019; 4(2): 154-158.

11. Parikh BJ, Chilani AH, Nayak RC, et al. Histopathological spectrum of lesions of upper gastrointestinal tract -a study of endoscopic biopsies.Asian Journal of Medical Sciences 2024; 15(4): 211-217.
12. Hirachand S, Sthapit RR, Gurung P, et al. Histopathological spectrum of upper gastrointestinal endoscopic biopsies. J BP Koirala Institute Health Sci 2018; 1(1): 67-74.
13. Theresa JM, Lavanya M, Rakesh JG and Basha SK. Evaluating the spectrum of histomorphological patterns on endoscopic biopsy in patients with upper gastrointestinal tract disorders. Trop J Pathol Microbiol. 2019; 6(1): 1-8.
14. Qureshi NA, Hallisey MT, Fielding JW: Outcome of index upper gastrointestinal endoscopy in patients presenting with dysphagia in tertiary care hospital - a 10 year review. BMC Gastroenterol 2007; 7:43.

Original Article

Breast Self-Examination Knowledge and Its Determinants among Female Nursing Students of Rangpur

***Afrose T[1], Imran SA[2], Roy SK[3], Tasnim N[4], Khatun MM[5]**

Abstract

Background: Breast cancer is a significant health concern globally, and early detection through breast self-examination (BSE) is crucial. Nursing students, as future healthcare providers, play a vital role in promoting BSE. This study aimed to assess BSE knowledge and its determinants among female nursing students in Rangpur, Bangladesh.

***Objective:** To evaluate the level of BSE knowledge and identify associated socio-demographic, educational, and familial determinants among female nursing students.*

***Materials and Methods:** A cross-sectional study was conducted among 150 female nursing students from different Nursing Colleges. Data were collected using a structured questionnaire assessing socio-demographic characteristics, prior breast health education, family history of breast cancer, and BSE knowledge. Descriptive statistics and independent t-tests were used for data analysis.*

***Results:** The mean age of the participants was 21.3 years (SD=1.5). While 90% of students had heard of BSE, only 40% demonstrated comprehensive knowledge. BSE knowledge scores significantly increased with academic progression (p=0.03). Students with prior breast health education had higher mean knowledge scores (6.0, SD=1.0) compared to those without (4.7, SD=1.1; p=0.01). Participants with a family history of breast cancer also showed higher knowledge scores (6.3, SD=0.9) than those without (5.1, SD=1.1; p=0.04).*

***Conclusion:** Although awareness of BSE was high, comprehensive knowledge was limited. Academic progression, prior breast health education, and family history of breast cancer were significant determinants of BSE knowledge. Targeted educational interventions are crucial to improve BSE knowledge and promote regular practice among nursing students.*

Keywords: Breast Self-Examination, Nursing students, Breast cancer, Determinants

Introduction

Breast cancer is a leading cause of cancer-related mortality among women globally, with significant impact on public health, particularly in developing countries.[1] Early detection remains a cornerstone of breast cancer control, and breast self-examination (BSE) is a readily accessible and cost-effective method for promoting awareness and facilitating early detection. While clinical breast examination and mammography are considered gold standards, BSE empowers women to take an active role in monitoring their breast health.[2]

The effectiveness of BSE hinges on adequate knowledge and consistent practice. Studies have consistently demonstrated a positive correlation between BSE knowledge and the likelihood of regular practice. However, several factors influence BSE knowledge levels, including socio-demographic characteristics, educational background, cultural beliefs, and access to health information.[3]

Nursing students, as future healthcare professionals, are a critical population in promoting breast cancer awareness and BSE practice. Their knowledge and attitudes towards BSE not only influence their own

1. **Dr Tanzina Afrose**
Associate Professor, Department of Community Medicine & Public Helath
Rangpur Community Medical College
Email: afrosetanzAina@gmail.com
Mobile: 01780665509
2. **Dr. Shah Ahasanul Imran**
Associate Professor & Head
Department of Community Medicine & Public Helath
Rangpur Community Medical College
3. **Dr. Shishir Kanti Roy**
Research Associate, ARTC
4. **Nishat Tasnim**
Nursing Instructor
Rangpur Community Nursing College
5. **Most. Morsheda Khatun**
Nursing Instructor
Rangpur Community Nursing College

For Correspondence

health behaviors but also shape their ability to educate and counsel other women. Therefore, understanding the determinants of BSE knowledge among female nursing students is crucial for developing targeted interventions to improve their awareness and practice.

Previous research has highlighted significant knowledge gaps regarding BSE among nursing students in various countries. For instance, studies conducted in Nigeria and Turkey revealed that a substantial proportion of nursing students lacked adequate knowledge about the correct BSE technique, frequency, and timing.[4,5] Similarly, research in Asian countries like India and Pakistan has shown that cultural beliefs and misconceptions surrounding breast cancer often impede BSE practice among female students.[6,7]

In Bangladesh, breast cancer incidence is on the rise, and awareness campaigns are crucial for early detection. Studies have indicated that knowledge and practice of BSE are generally low among Bangladeshi women, with limited access to information and healthcare services exacerbating the problem.[8] Given their future role in healthcare delivery, nursing students in Rangpur represent a vital target group for interventions aimed at improving breast cancer awareness and BSE practice.

Several determinants have been identified as influencing BSE knowledge among nursing students. Educational interventions, including lectures, workshops, and practical demonstrations, have been shown to significantly enhance knowledge and improve BSE practice.[9] Access to information through various sources, such as textbooks, journals, and the internet, also plays a crucial role in shaping knowledge levels.

Furthermore, socio-demographic factors, such as age, marital status, and family history of breast cancer, may influence BSE knowledge and practice.[10] Cultural beliefs and attitudes towards cancer, as well as perceived susceptibility to the disease, can also act as barriers to BSE practice. In the context of Rangpur, understanding the specific cultural and socio-economic factors that influence BSE knowledge among female nursing students is essential for developing culturally sensitive and effective interventions.

In summary, the knowledge of breast self-examination and its determinants among female nursing student is crucial for early breast cancer detection. Nursing students are future health care providers, and their knowledge and practice of BSE is vital. Studies show that knowledge gaps exist globally and in Bangladesh. Understanding the determinants of knowledge in the specific region of Rangpur will allow for targeted interventions to be developed. So, this study aims to assess breast self-examination knowledge and its determinants among female nursing students in Rangpur, Bangladesh.

Materials and Methods:

A descriptive cross-sectional study was conducted among 150 female nursing students enrolled from different nursing colleges of Rangpur between October and December 2024. Participants were selected using stratified random samplings to ensure representation across all academic years.

Data was collected using a self-administered structured questionnaire adapted from previous studies on BSE knowledge and practice. The questionnaire comprised sections on demographic information, knowledge about breast cancer and BSE, and factors influencing BSE knowledge. The knowledge section included questions about the purpose, frequency, timing, and techniques of BSE.

After obtaining informed consent, the questionnaire was distributed to participants during scheduled class times. Participants completed the questionnaire anonymously to ensure confidentiality and encourage honest responses.

Completed questionnaires were coded and entered SPSS version 25 for analysis. Descriptive statistics were used to summarize demographic data and knowledge scores. Chi-square tests and logistic regression analyses were performed to identify associations between BSE knowledge and potential determinants.

Results:

Table-I presents the age distribution of 150 female nursing students from Rangpur Nursing College who participated in the study. The data are categorized into four age ranges: 18–19 years, 20–21 years, 22–23 years, and 24–25 years. Each category lists the corresponding number of students and their percentage within the total sample. The majority of participants (80%) fall within the 20–23-year age bracket, with equal representation (40%) in both the 20–21 and 22–23-year groups. Smaller proportions are observed in the 18–19 and 24–25-year ranges, each comprising 10% of the sample. The mean age of the participants is 21.3 years, with a standard deviation of 1.5 years, indicating a relatively

homogenous age distribution centered around 21 years.

Table-I: Age Distribution of Female Nursing Students in Rangpur

Age Range (Years)	Number of Students	Percentage
18–19	15	10
20–21	60	40
22–23	60	40
24–25	15	10
Total	150	100

Table-II presents the distribution of 150 female nursing students in Rangpur across different academic years. The cohort comprises 45 first-year students (30%), 37 second-year students (25%), 38 third-year students (25%), and 30 fourth-year students (20%). This distribution reflects a balanced representation across all academic levels, with a slightly higher proportion of students in the earlier years. Such a composition allows for a comprehensive assessment of Breast Self-Examination (BSE) knowledge and its determinants across varying stages of nursing education.

Table-II: Distribution of Participants by Academic Year

Academic Year	Number of Students	Percentage
1st Year	45	30
2nd Year	37.5	25
3rd Year	37.5	25
4th Year	30	20
Total	150	100

Figure-1 presents the proportion of female nursing students in Rangpur who reported prior exposure to breast health education. The chart shows that 60% of participants had received breast health education , whereas 40% had not.

This distribution suggests that while a majority of students have been exposed to breast health education, a significant portion (40%) lacks prior knowledge or formal training in this area. These findings highlight the need for improved educational interventions to ensure all nursing students are adequately informed about breast self-examination (BSE) and related breast health practices.

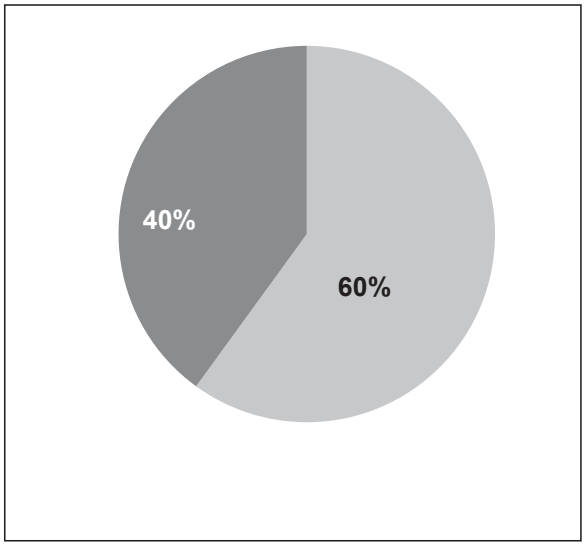

Figure-1: Prior Exposure to Breast Health Education among Participants

Figure-2 presents the proportion of female nursing students in Rangpur who reported their family history of breast cancer. The chart shows that 85% of participants had no family history of breast cancer, whereas 15% had family history of breast cancer.

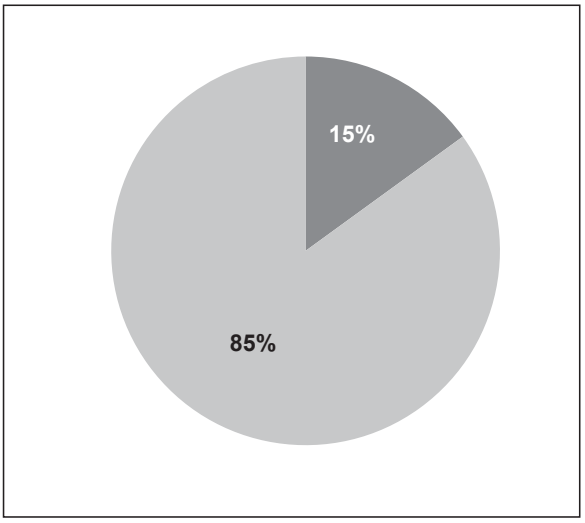

Figure-2: Family History of Breast Cancer Among Participants

Table-III illustrates that while a majority (90%) of the participants were aware of BSE, only 40% possessed comprehensive knowledge encompassing its purpose, appropriate timing, and techniques. Furthermore, 45% of the students were aware that BSE should be performed monthly, and 35% correctly identified the optimal timing in relation to the menstrual cycle. These findings highlight the need for enhanced educational interventions to improve BSE knowledge among nursing students.

Table-III: Awareness and Knowledge of Breast Self-Examination Among Participants

Academic Year	Number of Students	Percentage
Heard of BSE	135	90
Comprehensive knowledge of BSE	60	40
Knew BSE should be performed monthly	68	45
Correctly identified optimal timing related to menstrual cycle	53	35
Total Participants	150	100

Table-IV presents the study assessed Breast Self-Examination (BSE) knowledge among 150 female nursing students in Rangpur, focusing on academic year, prior breast health education, and family history of breast cancer. Mean knowledge scores increased with academic progression: 1st Year students scored 4.5 (SD=1.2), 2nd Year 5.8 (SD=1.0), 3rd Year 6.2 (SD=0.9), and 4th Year 6.5 (SD=0.8), with a significant difference (p=0.03). Those with prior breast health education had higher mean scores (6.0, SD=1.0) than those without (4.7, SD=1.1), also significant (p=0.01). Additionally, participants with a family history of breast cancer scored higher (6.3, SD=0.9) than those without (5.1, SD=1.1), with a significant difference (p=0.04). These findings suggest that advanced academic standing, breast health education, and familial cancer history are associated with better BSE knowledge among these students (Table-II).

Table-IV: Distribution of BSE Knowledge Scores by Determinants

Determinant	N	Mean Knowledge Score (SD)	p-value
Academic Year			
1st Year	45	4.5(1.2)	0.03*
2nd Year	37	5.8(1.0)	
3rd Year	38	6.2(0.9)	
4th Year	30	6.5(0.8)	
Breast Health Education			
Yes	90	6.0(1.0)	0.01**
No	60	4.7(1.1)	
Family History of Breast Cancer			
Yes	22	6.3(0.9)	0.04*
No	128	5.1(1.1)	

*Note: *p-values indicate significance levels (*p < 0.05, **p < 0.01).

Discussion:

This study examined the knowledge of breast self-examination (BSE) and its determinants among a cohort of female nursing students in Rangpur, Bangladesh. The results revealed a nuanced understanding of BSE, characterized by significant variations in knowledge levels and the identification of several key determinants.

The demographic profile of the participants, predominantly aged between 20 and 23 years, signifies a population primed for health education interventions. This age range is pivotal for establishing lifelong health behaviors, underscoring the importance of targeted educational programs during this developmental stage.

The distribution of participants across academic years provided a valuable opportunity to assess the progression of BSE knowledge throughout their nursing education. Notably, a statistically significant increase in mean knowledge scores was observed with advancing academic year. This finding is consistent with the established premise that cumulative exposure to medical and health-related curricula enhances health literacy.[11] The consistent augmentation of knowledge from the first to the fourth year suggests the efficacy of the nursing

program in imparting critical information regarding BSE.

However, a notable discrepancy was identified between awareness and comprehensive knowledge. While a substantial majority (90%) of participants acknowledged familiarity with BSE, only 40% demonstrated a thorough understanding of its purpose, appropriate timing, and techniques. This disparity underscores a critical gap in the depth of knowledge, indicating a need for refined educational strategies. This finding echoes observations in prior research, where superficial awareness often masks a lack of substantive understanding.[12] Furthermore, the limited recognition of the recommended monthly frequency (45%) and the optimal timing relative to the menstrual cycle (35%) highlights the necessity for pedagogical interventions that emphasize the practical application of BSE knowledge.

A significant determinant of BSE knowledge was prior exposure to breast health education. Participants who had received such education exhibited significantly higher mean knowledge scores. This finding reinforces the documented impact of educational interventions on health-related knowledge and behaviors.[13] The fact that a considerable portion (40%) of the participants lacked prior breast health education accentuates the imperative for widespread and consistent educational initiatives.

Furthermore, a positive association was observed between a family history of breast cancer and BSE knowledge scores. This suggests that personal relevance, driven by familial experiences, motivates individuals to acquire and retain information regarding BSE. This observation aligns with studies indicating that familial cancer history influences health-seeking behaviors.[14]

Conclusion:

This study demonstrates that while awareness of BSE is relatively high among female nursing students in Rangpur, comprehensive knowledge and practical understanding are lacking. Academic progression, prior breast health education, and a family history of breast cancer were identified as significant determinants of BSE knowledge. These findings emphasize the need for targeted educational interventions to enhance BSE knowledge and promote regular practice among nursing students, who will play a crucial role in disseminating health information to the broader community.

References:

1. Luo C, Li N, Lu B, Cai J, Lu M, Zhang Y, Chen H, Dai M. Global and regional trends in incidence and mortality of female breast cancer and associated factors at national level in 2000 to 2019. Chinese medical journal. 2022 Jan 5;135(01):42-51.
2. World Health Organization. Global breast cancer initiative implementation framework: assessing, strengthening and scaling-up of services for the early detection and management of breast cancer. World Health Organization; 2023 Mar 7.
3. Aslam RF, Qasim K, Butt SM, Saad M, Aziz SA, Raza R. Breast Cancer and Breast Self-Examination Awareness Among Females of Reproductive Age. Insights-Journal of Health and Rehabilitation. 2025 Feb 18;3(1 (Health & Rehab)):510-8.
4. Uruntie RO, Oputa CH, Peters E, Otovwe A. Effect of educational intervention on the knowledge, attitude and practice of breast self-examination among female students at a private university in Southern Nigeria. Bmc Cancer. 2024 Mar 19;24(1):355.
5. Koc G, Gulen-Savas H, Ergol S, Yildirim-Cetinkaya M, Aydin N. Female university students' knowledge and practice of breast self-examination in Turkey. Nigerian journal of clinical practice. 2019 Mar 1;22(3):410-5.
6. Sujindra E, Elamurugan T. Knowledge, attitude, and practice of breast self-examination in female nursing students. Int J Educ Psychol Res. 2015 Apr 1;1(2):71.
7. Javaeed A, Rasheed I, Shafqat F. Knowledge, attitude, and practice of breast self-examination among female undergraduate medical students in Poonch Medical College, Azad Kashmir. J Pak Med Assoc. 2021 Feb 1;71(2).
8. Sarker R, Islam MS, Moonajilin MS, Rahman M, Gesesew HA, Ward PR. Knowledge of breast cancer and breast self-examination practices and its barriers among university female students in Bangladesh: Findings from a cross-sectional study. Plos one. 2022 Jun 28;17(6):e0270417.
9. Alwabr GM. Breast cancer educational program and breast self-examination in Sana'a, Yemen. Curr Life Sci. 2016 Apr;2:27-35.
10. Birnbaum JK, Duggan C, Anderson BO, Etzioni R. Early detection and treatment strategies for breast cancer in low-income and upper

middle-income countries: a modelling study. The Lancet Global Health. 2018 Aug 1;6(8):e885-93.

11. Mekonnen M, Asefa T. Knowledge, attitude and practice of breast self examination among female undergraduate nursing students at university of gondar, college of medicine and health sciences. Hosp Palliat Med Int J. 2019;3(5):167-73.
12. Özdemir A, Akansel N, Tunc GÇ, Aydin N, Erdem S. Determination of breast self-examination knowledge and breast self-examination practices among women and effects of education on their knowledge. International Journal of Caring Sciences. 2014 Sep 1;7(3):792-8.
13. Hussein DM, Alorf H, Al-Sogaih Y, Alorf S, Alaskar R, Al-Mahana A, Alsalhowb W, Alibrahim A, Saka M, Alhazimi A, Baghirova A. Breast cancer awareness and breast self-examination in Northern Saudi Arabia. Saudi Med J. 2013;34(7):681-8.
14. Ginsburg O, Yip CH, Brooks A, Cabanes A, Caleffi M, Dunstan Yataco JA, Gyawali B, McCormack V, McLaughlin de Anderson M, Mehrotra R, Mohar A. Breast cancer early detection: A phased approach to implementation. Cancer. 2020 May 15;126: 2379-93.

Original Article

Histopathological Study of Colorectal Adenocarcinomas

*Mashrufa R[1], Sadique GA[2], Aktar A[3], Jannat A[4], Tania MF[5]

Abstract:

Background*: Colorectal carcinoma is the most common malignancy of the gastrointestinal tract. Adenocarcinomas account for 90% of the colorectal carcinomas.*

Objective*: This is a study to evaluate histopathologically the colorectal adenocarcinomas based on age, sex distribution and grading.*

Materials and methods: *The study comprises of 50 paraffin blocks of all patients who were histopathologically diagnosed as having colorectal adenocarcinoma in the Department of Pathology, Rajshahi Medical College.*

Results *- Out of total 50 cases, most 13 (26%) cases belonged to the age group of 51-60 years. The age group ranged from 20-75 years with a mean age 51.2±13.74. There were 40 (80%) males and 10 (20%) females with male to female ratio 4:1. Rectum being the most common site of involvement (36%) followed by ascending colon, sigmoid colon and descending colon. In this study, most 20 (40%) were grade 3 tumors, followed by 18 (36%) grade 2 tumors and 12 (24%) grade 1 tumors.*

Conclusion*- This study has showed grade 3 tumors outnumbered the grade 2 and grade 1 tumors. Histopathologic diagnosis remain paramount importance in accurate diagnosis of colorectal adenocarcinomas with grading and predict prognosis.*

Keywords: Adenocarcinoma, Tumor grade

Introduction:

Cancers which arise in the colon or rectum have many features in common and are therefore reffered together as colorectal carcinoma. Colorectal cancer is the most common malignancy of the gastrointestinal tract and ranks third in terms of incidence and second in mortality, Overall. More than 1.9 million new colorectal cancer cases and 9,35,000 death are estimated to occur in 2020, representing about 1 in 10 cancer cases and deaths.[1] According to GLOBOCAN 2020, the prevalence of colon and rectal cancer in Bangladesh are 3.28% and 3.15% respectively in last five years.[2] Adenocarcinomas account for 90% of the colorectal carcinomas. It is graded as well, moderately and poorly differentiated mainly on the regularity of the glandular architecture as per the WHO classification.[3]

Mucinous adenocarcinoma is a subtype of colorectal adenocarcinoma with more than 50% of the lesion composed of mucin and is characterized by pools of extracellular mucin that contain malignant epithelium as acinar structures, strips of cells or single cells. The colorectal carcinoma cases with less than 20% mucin are categorized as mild, those cases with 20-50% mucin as moderate and those with more than 50% mucin as marked.[3]

Lower grade cancers tend to grow slowly and are less likely to spread while higher grade cancers tend to grow more quickly and are more likely to spread

1. **Dr. Mashrufa Rezmin**
Assistant Professor, Department of Pathology
Rangpur Community Medical College.
Email:- Mashrufarezminr@gmail.com
Mobile: 01729-720732
2. **Dr. Gazi Abdus Sadique**
Lecturer, Department of Pathology
Satkhira Medical College
3. **Dr. Arefa Aktar**
Associate Professor, Department of Microbiology
Rangpur Community Medical College
4. **Dr. Arika Jannat**
Assistant Professor, Department of Pharmacology
Rangpur Community Medical College
5. **Dr. Most. Fahmida Tania**
Assistant Professor, Department of Physiology
Rangpur Community Medical College

For Correspondence

than low-grade cancers. This helps in planning the treatment. The grade can also help the healthcare team predict future outcomes (Prognosis) and how the cancer might respond to treatment.[4]

According to WHO histological grading system 2010,

Well differentiated (Grade 1): Lesions exhibit glandular structures in >95% of the tumor.

Moderately differentiated (Grade 2): Glandular structures comprise 50-95% of the tumor.

Poorly differentiated (Grade 3): comprise 0-<49% of the gland formation.

Despite advances in surgical techniques and adjuvant chemotherapeutic regimens, colorectal carcinoma remains one of the major leading causes of cancer-related deaths worldwide.[4]

This study was undertaken to evaluate histopathologically the colorectal adenocarcinomas based on age, sex and grading and to compare our experience with findings in this literature.

Materials and Methods:

The present study was carried out in the Department of Pathology, Rajshahi Medical College from March 2021 to February 2023. It comprises 50 paraffin blocks of all patients, who were histopathologically diagnosed as having colorectal adenocarcinomas in this department. All histopathologically confirmed colorectal adenocarcinoma cases were included in this study. Poorly fixed sample were excluded.
Hematoxylin and Eosin stain was done according to the protocol followed in the Department of Pathology, Rajshahi Medical College. Slides of all cases were examined and then they were graded as well (grade 1), moderate (grade 2) and poorly (grade 3) differentiated carcinomas.

Results:

The present study includes 50 cases of colorectal adenocaremomas reported in the Department of Pathology, Rajshahi Medical College. The age group ranged from 20-75 years with a mean age 51.2±13.74. Most 13 (26%) cases belonged to the age group of 51-60 years. 3 (6%) cases were less than 30 years, 10 (20%) cases were within 31-40 years, 12 (24%) cases were within 41-50 years and 12 (24%) were in the age group of more than 60 years.

Table-I shows the age wise distribution of colorectal adenocarcinomas in our study.

Table-I: Distribution of the study subjects by their age (n=50)

Age (years)	Frequency	Percentage
31-40	10	20%
41-50	12	24%
51-60	13	26%
>60	12	24%
Mean±SD	51.2 ±13 .74 (20-75)	

Range (Min-Max)

There were 40 (80%) males and 10(20%) females with a male to female ratio 4:1. Figure - 1 shows gender distribution.

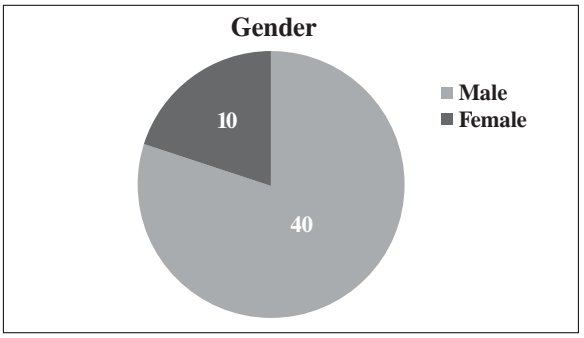

Figure-1: Pie chart showing gender distribution (n=50)

Out of 50 cases, most were located in the rectum 18 (36%), followed by ascending Colon 16 (32%), sigmoid colon 13 (26%) and descending colon 3(6%). Figure – 2 shows distribution of cases according to the site of the tumor.

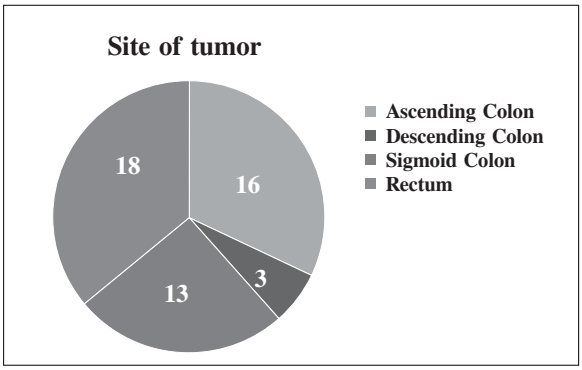

Figure-2: Pie chart showing distribution of cases according to the site of the tumor (n=50)

Most 20(40%) were grade-3 tumors, followed by 18 (36%) grade 2 tumors and 12 (24%) grade 1 tumors. Figure-3 shows distribution of study subjects according to tumor grade.

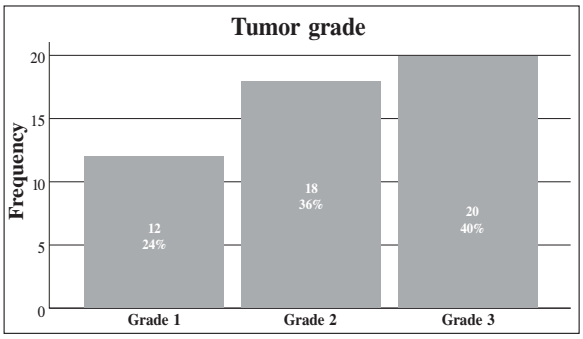

Figure-3: Bar diagram showing distribution of study subjects according to tumor grade (n=50)

Figure-4: Photograph showing cut section of colorectal carcinoma specimen

Figure-5: Photograph showing cut section of colorectal carcinoma specimen

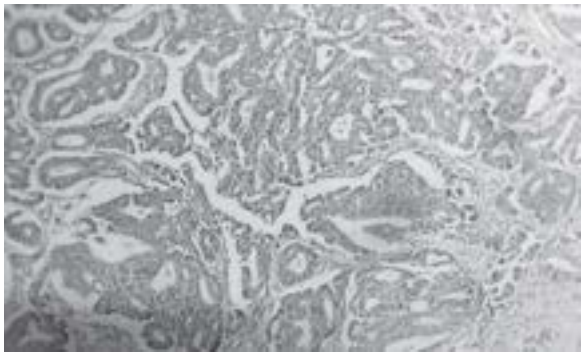

Figure-6: Photomicrograph shows grade 1 colorectal adenocarcinoma (H&E)

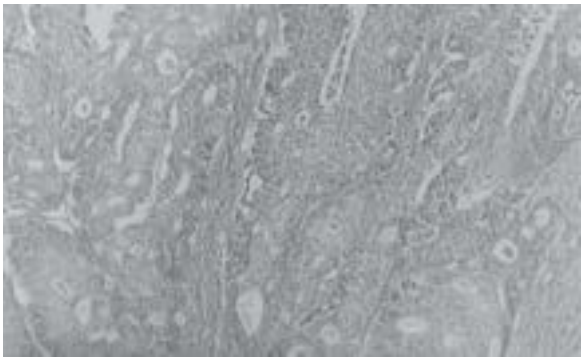

Figure-7: Photomicrograph shows grade 2 colorectal adenocarcinoma (H&E)

Figure-8: Photomicrograph shows grade 3 colorectal adenocarcinoma (H&E)

Discussion:

Colorectal cancer is the most common malignancy of the gastrointestinal tract and ranks third in terms of incidence and second in terms of mortality.[1] Adenocarcinomas account for most colorectal carcinomas, about 90%.[3] Colorectal adenocarcinoma in a heterogenous disease that involves multiple tumorigenic pathways. Prediction of prognosis in colorectal cancer is vital for the choice of therapeutic options. Histopathologic diagnosis remain paramount in this aspect.[6]

Since, gross and histopathological evaluation in very essential to grade and stage the tumor and guide in further management, we have attempted to evaluate the histopathological grading of colorectal adenocarcinoma. This present study included 50 colorectal adenocarcinoma cases.

The age group ranged from 20-75 years with a mean age 51.2±13.74. Out of 50 total study cases, most 40 (80%) were males and 10 (20%) were females. In India, Borgohain et al.[3] Conducted a similar study on colorectal adenocarcinoma. A total of 50 cases of histologically confirmed colorectal carcinoma irrespective of age and sex were studied. The peak

incidence was seen between 40-49 years with maximum cases in between 30-70 years of age and predominantly the cases were males. Another study conducted by Parul et al.[7] showed that the age interval of patients was from 23 to 78 year, the median age being 53 years. Most (82-22%) of the cases occured in patients above 40 years of age. The male: female ratio was 1.4:1. There were 52 (57.77%) male patients and 38 (42.22%) female patients. In current study most tumors were in the rectum 18 (36%), followed by ascending colon 16 (32%), sigmoid colon 13 (26%) and descending colon 3 (6%). Another study, was conducted by Lucky et al.[8] on colorectal adenocarcinoma and it was seen that the commonest site of growth was rectum (59%) followed by ascending colon (16%), transverse colon (12%), sigmoid colon (8%) and descending colon (6%). Parul et al.[7] found that most (40%) of the carcinomas had a right colonic location followed by rectum with 24.44% of cases. Left colon accounted for 20% of the cases, where as rectosigmoid region accounted for 15.55% cases.

In this current study out of 50 colorectal adenocarcinoma, cases, most 20 (40%) were grade 3 tumors, followed by 18 (36%) grade 2 tumors and 12 (24%) grade 1 tumors. In a study conducted by lucky et al[7] it was found that out of the 50 cases there were 41 (82%) low grade tumors and 9 (18%) high grade tumors.

Conclusion:

In our study, high grade tumors outnumbered the low grade tumors. The study shows histopathological evaluation is essential to grade and predict future prognosis.

References:

1. Sung H, Ferlay j, Siegel RL, Laversanne M, et al. Global cancer statistics 2020: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. CA: A cancer journal for clinician. 2021;71(3):209–249.
2. WHO 2020, Globocan 2020, `Estimated cancer incidence, mortality and prevalence worldwide in 2020', *https://gco.iarc.fr/today/ data/ factsheets/ populations/50-bangladesh-fact-sheets.pdf*, (accured on 15/01/2020)
3. Borghain M, Dowerah L, Gogoi G. Evaluation of the significance of mucin stain in a spectrum of colorectal carcinoma. Scholars journal of applied medical sciences. 2017;5(3):886–892
4. Hamilton SR, M D, Liu B, et al. The molecular basis of Turcot's syndrome. New england journal of medicine. 1995;332(13):839-847.
5. Andre T, M D, et al. Pembrolizumab in microsatellite- instability-high advanced colorectal cancer. The new england journal of medicine. 2020;383(23):2207-2218.
6. Shilpa K, Monica GS. Histopathological study of colorectal carcinoma. Journal of medical science and clinical research. 2017;5 (4):19792–19795.
7. Parul j. Diagnostic and prognostic significance of different mucin expression, preoperative. CEA and CA–125 in colorectal carcinoma: A clinicopathological study. j Nat Sci Bio Med. 2014;5(2):404–408.
8. Lucky M, Uttam K. A clinicopathological study of colorectal carcinoma with special reference to mucin content. Indian journal of applied research. 2016;6(7):558–561.

Original Article

Post-Surgical Outcomes in Patients with Diabetic Foot Ulcers

Bhattacharjee M[1], Bhattacharjee M[2], Islam MR[3], Roy BC[4], Ribon AKMRQ[5]

Abstract:

Background: *Diabetic foot ulcers (DFUs) remain a significant healthcare challenge, often culminating in severe complications such as non-healing wounds and lower extremity amputations.*

Objective: *This study aims to evaluate the outcomes of surgical interventions in patients with DFUs, focusing on wound healing rates, ulcer recurrence, limb salvage, and survival rates.*

Methods & Meterials: *A cohort of 150 patients with DFUs were assessed post-surgery over a one-year period (January 2022–January 2023). Socio-demographic data, including age, gender, duration of diabetes, and comorbidities, were collected. Outcomes were evaluated based on wound healing, ulcer recurrence, limb salvage, and survival rates.*

Results: *At the one-year follow-up, 78% of patients achieved complete wound healing within six months. However, 17% experienced delayed healing requiring further interventions, while 5% had chronic non-healing wounds. Ulcer recurrence occurred in 25% of patients, predominantly at the same anatomical site. Limb salvage was achieved in 88% of patients, while 12% required major amputations due to persistent infections. The mortality rate was 8%, primarily linked to cardiovascular complications.*

Conclusion: *Surgical interventions for DFUs demonstrate significant efficacy in wound healing and limb preservation. However, high rates of recurrence and associated mortality underscore the necessity for continuous monitoring and a multidisciplinary management approach to improve long-term outcomes in diabetic populations.*

Keywords: Diabetic Foot Ulcers (DFUs), Surgical Intervention, Wound Healing Rates, Foot Care, Long-Term Outcomes

1. **Dr. Mriganko Bhattacharjee**
   Assistant Professor & Head
   Dept. of Orthopedics and Trauma Surgery
   Rangpur Community Medical College & Hospital
   Rangpur, Bangladesh
   Mobile: +880 1710-987597
   Email: dr.mrigankobhattacharjee@gmail.com
2. **Dr. Mitali Bhattacharjee**
   Assistant Professor
   Dept. of Obstetrics and Gynocology
   Rangpur Community Medical College & Hospital
3. **Dr. Md. Rezwanul Islam**
   Registrar, Dept. of Orthopedics and Trauma Surgery
   Rangpur Community Medical College & Hospital
4. **Dr. Bakul Chandra Roy**
   Assistant Registrar
   Dept. of Orthopedics and Trauma Surgery
   Rangpur Community Medical College & Hospital
5. **Dr .A. K. M. Rashedul Quadir Ribon**
   Indoor Medical Officer
   Dept. of Orthopedics and Trauma Surgery
   Rangpur Community Medical College & Hospital

For Correspondence

Introduction:

Diabetic foot ulcers (DFUs) are a significant complication of diabetes, affecting approximately 15% of individuals with diabetes at some point in their lives. These ulcers can lead to severe consequences, including infections, hospitalization, and even lower limb amputation. Surgical intervention is often necessary to manage DFUs effectively, particularly in cases where conservative treatments fail.[1,2] DFUs can result in severe morbidity and, in severe cases, may necessitate surgical intervention. The underlying causes of foot ulceration are complex, clinical presentations can vary widely, and effective management requires prompt expert evaluation.[3]

A defining characteristic of DFUs is the presence of necrotic tissue, which can sometimes extend to the bone, significantly increasing the risk of osteomyelitis.[4,5] Treatment options include surgical debridement to eliminate nonviable tissue or bone and, in severe cases, more extensive procedures

such as minor or major amputations.[6] Surgical interventions intended to promote healing are classified as curative (class III), while emergent surgeries (class IV) address acute infections to prevent their progression. Evidence indicates that these surgical classifications may help predict the increasing risk of high-level amputations. Studies on surgical debridement outcomes frequently involve a higher proportion of class IV surgeries, while those reporting amputation rates typically include both class III and IV procedures.[7] Healing outcomes in these studies range widely (63–97%), with additional surgeries required in 27–62% of cases. Non-healing and major amputations are most commonly linked to infection, peripheral arterial occlusive disease (PAOD), and advanced age.[8] However, studies on the effectiveness of revascularization in preventing major amputations have produced inconsistent findings.[9] This article investigates the post-surgical outcomes in patients with diabetic foot ulcers, emphasizing the need to understand these outcomes to enhance patient care and minimize complications.

Material and Methods

A retrospective cohort study was conducted at a tertiary care center involving 150 patients with diabetic foot ulcers (DFUs) who underwent surgical interventions between January 2022 and January 2023. Patients aged 45–85 years were included if they underwent Class III or IV diabetic foot surgeries, such as debridement, minor amputations, or reconstructive procedures, and had at least 12 months of follow-up. Patients were excluded if they had undergone Class I or II surgeries, prophylactic procedures, or amputations above the metatarsal level.

Data for this study were collected from a cohort of patients with diabetic foot ulcers (DFUs) who underwent surgical intervention, including debridement, minor amputations, and reconstructive procedures. Patient demographics, medical histories, glycemic control, peripheral neuropathy, and infection status were recorded. Surgical outcomes, including wound healing, ulcer recurrence, and limb salvage rates, were tracked for one year. Data were analyzed using SPSS (version 25). Kaplan-Meier survival analysis was used to estimate healing times, and logistic regression identified factors associated with poor outcomes. The role of revascularization in preventing major amputations was assessed through multivariate analysis, adjusting for potential confounders such as age, comorbidities, and infection severity.

Results:

The cohort included 150 patients, with a mean age of 62 years (range: 45-85 years). Of these, 60% were male, and 40% were female.

The majority (70%) had type 2 diabetes for more than 10 years. Comorbidities included hypertension (65%), peripheral neuropathy (55%), and smoking history (40%) highlighting the prevalence of comorbidities that may impact healing outcomes. The majority (80%) of patients were from urban areas, and 70% had a low to moderate socioeconomic status, which may have influenced access to regular foot care and postoperative rehabilitation.

At one year, 78% of patients achieved complete wound healing within six months. Delayed healing was observed in 17%, requiring further

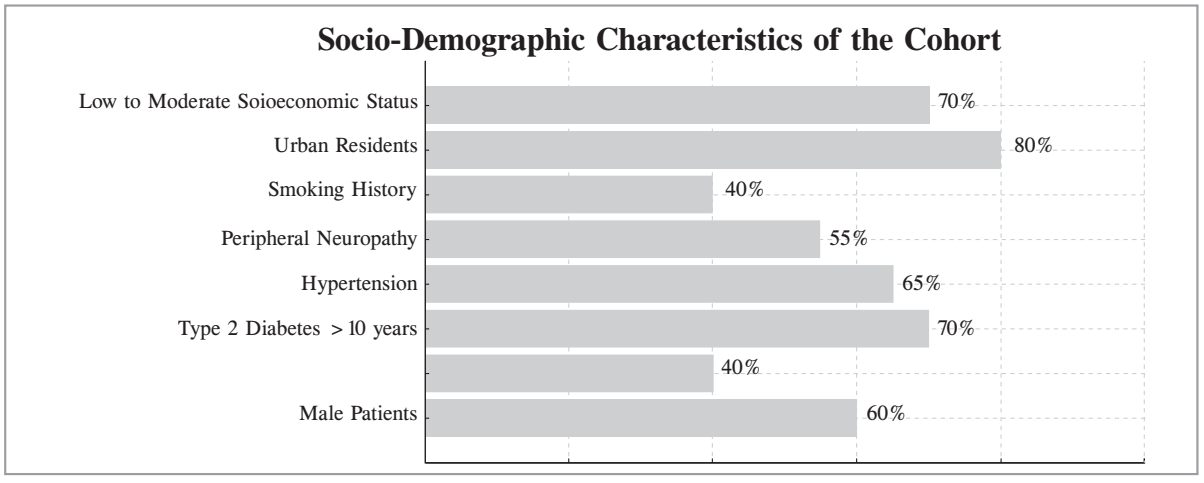

Figure-1: Socio-Demographic Characteristics of the Study Population

Table-I: Wound Healing Rates at One-Year Follow-Up

Healing Status	Frequency	Number of Patients (%)
Complete Healing	117	78%
Delayed Healing	25	17%
Non-Healing	8	5%

interventions. Chronic non-healing wounds were recorded in 5%, associated with poor glycemic control and infection. Patients with longer diabetes duration and those who smoked had significantly higher rates of non-healing wounds, underscoring the impact of socio-demographic factors on clinical outcomes.

Ulcer recurrence was observed in 30% of patients within two years, with new or recurrent ulcers primarily developing at the same anatomical site. Recurrence was particularly high in patients with peripheral neuropathy and poor glycemic control. Those from lower socioeconomic backgrounds were more likely to experience recurrence due to limited access to consistent follow-up care and education on foot care.

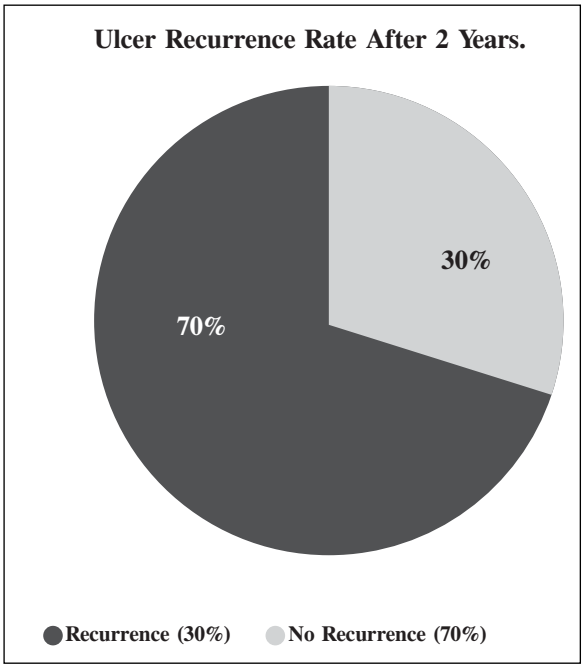

Figure 2: Ulcer Recurrence Status of the Study Population

Eighty-eight percent of patients retained their limbs. However, 12% underwent major amputations, largely due to severe infections or non-healing ulcers. Limb salvage rates were significantly higher in patients who adhered to regular foot care and rehabilitation protocols, with better outcomes observed among those from higher socioeconomic groups and patients who had access to multidisciplinary care.

Table-II: Limb Salvage Rates of the Study Population

Outcome	Frequency	Number of Patients (%)
Retained their limbs	132	88%
Required Amputations	18	12%

The mortality rate within the two-year follow-up period was 8%. Most deaths were linked to cardiovascular complications, emphasizing the systemic impact of diabetes. Mortality rates were higher in older patients and those with longer diabetes duration or multiple comorbidities, such as hypertension and smoking history. Despite improvements in foot-related outcomes through surgical intervention, these findings highlight the importance of a holistic approach to managing diabetic patients, focusing on both foot health and systemic disease control.

Discussion:

The findings demonstrate that surgical interventions remain critical in managing DFUs, with high success rates in wound healing and limb salvage. The study underscores the importance of comprehensive diabetes management, including glycemic control, infection prevention, and consistent follow-up care, to minimize recurrence and improve long-term outcomes.

Our study revealed that 70% of patients achieved full wound healing within 12 months of surgery, aligning with earlier research that reported healing rates of 60–80% following surgical debridement and reconstruction.[10] Nonetheless, delayed healing (25%) and chronic non-healing wounds (5%) remain pressing issues.[11] These outcomes highlight the critical need for improved glycemic control and the management of factors such as infection and ischemia to promote better healing in this patient group.

The notable 30% ulcer recurrence rate within two years is concerning but consistent with studies indicating recurrence rates of 25–50%.[12] This underscores the chronic and recurrent nature of diabetic foot ulcers, reinforcing the necessity for ongoing monitoring and preventative foot care,

particularly for high-risk individuals with neuropathy and suboptimal glycemic control.[12]

The limb salvage rate of 88% in our study is promising and aligns with other findings that underscore the effectiveness of surgical intervention in avoiding major amputations. Nevertheless, the 12% amputation rate underscores the serious nature of diabetic foot disease and the critical need for early and intensive management to improve outcomes. Key factors contributing to successful limb salvage include compliance with foot care guidelines, prompt wound care, and efficient management of infection and ischemia.[13]

The 8% mortality rate over two years serves as a stark reminder of the heightened mortality risk among individuals with diabetes, though it is lower than that reported in some historical studies. This improvement likely reflects progress in diabetes care and surgical practices. However, the link between mortality and cardiovascular complications highlights the necessity of addressing comorbid conditions and prioritizing cardiovascular health within this population.[14]

Although this study did not specifically examine the influence of sociodemographic factors on surgical outcomes, previous research indicates that elements such as socioeconomic status, healthcare access, and education level can profoundly affect wound healing, amputation rates, and mortality in diabetic foot disease.[15] Future research should explore these disparities in the context of surgical treatments to design targeted strategies and enhance outcomes for all patients.

Conclusion:

In conclusion, surgical intervention for diabetic foot ulcers can lead to significant improvements in healing rates and quality of life for patients. However, the high recurrence rate highlights the importance of comprehensive post-operative care and patient education. Future research should focus on the long-term outcomes of various surgical techniques and the effectiveness of multidisciplinary care in managing diabetic foot ulcers.

References:

1. Hao SP, Houck JR, Waldman OV, Baumhauer JF, Oh I. Prediction of post-interventional physical function in diabetic foot ulcer patients using patient-reported outcome measurement information system (PROMIS). Foot and Ankle Surgery. 2021 Feb 1;27(2):224-30.
2. Veldhoen D, Nube V, Molyneaux L, Twigg S. Doing better under pressure: An audit of post-surgical foot wounds in people with diabetes treated with negative pressure wound therapy (NPWT). Wound Practice & Research: Journal of the Australian Wound Management Association. 2014 Nov;22(4):188-92.
3. Vainieri E, Ahluwalia R, Slim H, Walton D, Manu C, Taori S, Wilkins J, Huang DY, Edmonds M, Rashid H, Kavarthapu V. Outcomes after emergency admission with a diabetic foot attack indicate a high rate of healing and limb salvage but increased mortality: 18-month follow-up study. Experimental and Clinical Endocrinology & Diabetes. 2022 Mar;130(03):165-71.
4. Hao SP, Houck JR, Waldman O, Baumhauer JF, Oh I. Preoperative Prediction of Postoperative Physical Function in Infected Diabetic Foot Ulcer Patients. Foot & Ankle Orthopaedics. 2019 Oct 16;4(4):2473011419S00200.
5. Vas P, Rayman G, Dhatariya K, Driver V, Hartemann A, Londahl M, Piaggesi A, Apelqvist J, Attinger C, Game F. Effectiveness of interventions to enhance healing of chronic foot ulcers in diabetes: a systematic review. Diabetes/metabolism research and reviews. 2020 Mar;36:e3284.
6. Edmonds M. Diabetic foot ulcers: practical treatment recommendations. Drugs. 2006 May;66:913-29.
7. Merchant M, Belekar D, Misquitta H. Study of Surgical Manifestations of Diabetic Foot Patients and Various Factors Influencing it. Drugs. 2020 Feb;1:3.
8. Armstrong DG, Lipsky BA. Diabetic foot infections: stepwise medical and surgical management. International wound journal. 2004 Jun;1(2):123-32.
9. Zgonis T, Stapleton JJ, Roukis TS. A stepwise approach to the surgical management of severe diabetic foot infections. Foot & Ankle Specialist. 2008 Feb;1(1):46-53.
10. Aragón-Sánchez J, Quintana-Marrero Y, Lázaro-Martínez JL, Hernández-Herrero MJ, García-Morales E, Beneit-Montesinos JV, Cabrera-Galván JJ. Necrotizing soft-tissue infections in the feet of patients with diabetes: outcome of surgical treatment and factors associated with limb loss and mortality. The international journal of lower extremity wounds. 2009 Sep;8(3):141-6.
11. Winkley K, Stahl D, Chalder T, Edmonds ME, Ismail K. Quality of life in people with their first

diabetic foot ulcer: a prospective cohort study. Journal of the American Podiatric Medical Association. 2009 Sep 1;99(5):406-14.

12. Taylor SM, Johnson BL, Samies NL, Rawlinson RD, Williamson LE, Davis SA, Kotrady JA, York JW, Langan III EM, Cull DL. Contemporary management of diabetic neuropathic foot ulceration: a study of 917 consecutively treated limbs. Journal of the American College of Surgeons. 2011 Apr 1;212(4):532-45.
13. Zgonis T, Stapleton JJ, Girard-Powell VA, Hagino RT. Surgical management of diabetic foot infections and amputations. AORN journal. 2008 May 1;87(5):935-50.
14. Lloyd-Jones DM, Hong Y, Labarthe D, Mozaffarian D, Appel LJ, Van Horn L, Greenlund K, Daniels S, Nichol G, Tomaselli GF, Arnett DK. Defining and setting national goals for cardiovascular health promotion and disease reduction: the American Heart Association's strategic Impact Goal through 2020 and beyond. Circulation. 2010 Feb 2;121(4):586-613.
15. Glynn LG, Valderas JM, Healy P, Burke E, Newell J, Gillespie P, Murphy AW. The prevalence of multimorbidity in primary care and its effect on health care utilization and cost. Family practice. 2011 Oct 1;28(5):516-23.

Original Article

Frequency of Microvascular Complications in Newly Detected Type-2 Diabetes Mellitus Patients

***Alam MM[1], Rahman MA[2], Begum MM[3]**

Abstract

Background: *Diabetes Mellitus (DM) is one of the most common chronic non-communicable disease and a common metabolic disorder*

Objectives*: To find out the frequency of microvascular complications in newly detected type-2 diabetes mellitus patients.*

Materials and Methods*: A cross sectional study was conducted in department of medicine and endocrinology, Rangpur Medical college hospital and diabetic Somiti of rangpur during the period of January 2011 to December 2011 on newly detected type-2 diabetes mellitus patients.*

A total number of 100 newly detected type-2 diabetes mellitus subjects were taken purposively for the convenience of the study to detect the frequency of microvascular complications in newly detected type-2 diabetes mellitus patients. Relevant information of all patients wear recorded with help of a proforma. They were investigated for retinopathy, nephropathy and neuropathy.

Results*: Among 100 study subjects 44(44%) male 16(16%) female had diabetes with microvascular complications. This study showed that 52% of study subjects had diabetic retinopathy, 24% had diabetic neuropathy and 20% had diabetic retinopathy.*

This study also showed that 20% subject had isolated diabetic nephropathy,4% had isolated diabetic neuropathy, none had isolated diabetic retinopathy and 36% had combined microvascular complications.

In this study frequency of microvascular complications in newly detected type-2 diabetes mellitus Patients were 60%.

Conclusion*: This study showed increasing age, increasing BMI and more severe fasting hyperglycemia significantly contribute to increasing frequency of microvascular complications.*

Keyword: Microvascular, Diabetic complication, Nephropathy, Neuropathy, Retinopathy, Type-2 Diabetes mellitus (T2DM)

Introduction:

Diabetes Mellitus (DM) is one of the most common chronic non-communicable disease and a common metabolic disorder.[1] It is increasingly common throughout the whole world.[2] The prevalence of T2DM is rising to epidemic proportion. The incidence of T2DM increased dramatically in the recent decade due to change in life style, food habit and increase prevalence in the obesity and longevity.[3] According to WHO approximately 135 million people of whole world have diabetes mellitus in 2004.[1] In Bangladesh, about 8.4 million people have diabetes and 4.7 million people are undiagnosed.[4] T2DM account for about 90% cases of diabetes.[5] About 80% patients of total T2DM reside in developing countries.[6] Type-2 DM is a serious disease due to its chronic complications. It constitutes substantial burden for both patients and health care system due to its premature morbidity. Through its microvascular and macrovascular complications.[2] It is likely that all blood vessels both small and large are abnormal in diabetic patients with long standing disease. Although there is generalized microangiopathy, but microvasculature of retina, renal glomeruli and large nerves seem to

1. **Dr. Md. Mahbubul Alam,**
Assistant Professor, Department of Medicine
Rangpur Community Medical College and Hospital
Rangpur, Bangladesh
Email: alammahbubul868@gmail.com
Mobile: 01740554466
2. **Dr. Md. Ataur Rahman**
Assistant Professor, Department of Ophthalmology
Rangpur Medical College, Rangpur
3. **Dr. Mst. Mahfuza Begum**
Assistant Registrar, Department of Gynaecology and Obstetrics
Rangpur Medical College & Hospital, Rangpur

For Correspondence

have significant pathology. As many as 37% of patient with diabetes suffer at least one microvascular complication and at least 13% have more than one.[7] Microvascular complications have a noticeable impact on quality of life of T2DM patients through fitness of work, disability and premature death.[3] Vascular complications are one of the most serious consequence of diabetes mellitus. Chronic complications in T2DM depends upon the severity and duration in hyperglycemia[2]. In developing countries poor glycemic control has been shown significant association with chronic complications. The cost of treating complications happen to even more than five times than treating diabetes itself. So management of diabetes become burden to the individual, family and the state itself.[3] Clinical course of T2DM has an asymptomatic phage which between the actual onset of hyperglycemia and clinical diagnosis and the phase lasts at least 4-7 years. These asymptomatic long pre-clinical phases may be 10-12 years estimated on the basis of the progression of microvascular complications.[8]

About 50% of patients have substantial macro or microvascular complications at the time of diagnosis.[9] Asian patients had more evidence of both macro and microvascular disease at the time of diagnosis of diabetes.[10] Early detection and early treatment of hyperglycemia can prevent or delay the progression of disease or its complications. Untreated hyperglycemia is an explanation for relative high prevalence of retinopathy in newly diagnosed T2DM patients. Diabetic retinopathy is a leading cause of visual disability in people with diabetes. when the patient was diagnosed at first time 25% already have established retinopathy.[11]

Upto 20% of patients with T2DM already have diabetic nephropathy when they are diagnosed with diabetes significant proportion of patients is found to have diabetic neuropathy at the initial time of diagnosis of DM. About 40.4% neuropathy is detected at the time diagnosis of type-2 DM.[12]

Microvascular complications from T2DM are common and evidence showed that early detection and identification of risk factors retinopathy, neuropathy and nephropathy may delay or prevent the progression toward blindness, end stage renal disease and diabetic foot ulcer respectively.[13] Long standing untreated hyperglycemia is responsible for the relatively high prevalence of microvascular complications in newly detected type to diabetes mellitus patients.[14]

It is apparent that evidence or prevalence of T2DM related complications are essential for adjustment of policies and practices in diabetic care management. Screening for microvascular complications in newly detected type 2 diabetes mellitus patients still have important implication for understanding the need of vigorous screening, effective prevention and management of T2DM was well reduced health care expenditure.

Materials and Methods

After the approval of the hospital ethical committee and informed consent of the patients the study was conducted in medicine and endocrinology department of Rangpur medical college hospital & diabetic somiti, Radhaballav, Rangpur during study period from January 2011 to December 2012. A total 100 type-2 diabetic subjects were included randomly in this study. The patient fulfilled the selection criteria were included in this study. Inclusion criteria: the patients with age between 18-64 years of either gender were included, who were diagnosed within two months as type-2 diabetes. Diagnosis of diabetes was done by reports of > 200mg/dl on two consecutive base line Random blood sugar and fasting blood sugar level > 110mg/dl on the following set criteria as defined by world health organization in 1999 and revised in 2005 along with no previous history of testing positive for type2 diabetes mellitus or taking any treatment for diabetes. Exclusion criteria included patient pregnancy with diabetes mellitus, Type-2 DM with acute complication, T2DM with steroid therapy. T2DM with unconsciousness, T2DM with cognitive impairment and T-2DM with chronic kidney disease. Demographic characteristics such as age and sex were recorded. Symptoms suggestive of diabetes or reletated complications were noted. Past history of hypertension and complications of diabetes were noted. Smoking or alcohol history was documented. For detecting diabetic retinopathy visual acuity was tested by logmar chart and fundi oculi was examined by direct and indirect ophthalmoscope and finding of retinopathy was categorized by ETDR system with the help of ophthalmologist. For detecting Neuropathy, Neuropathy symptom score and Neuropathy disability score was done. Neuropathy symptom score or Neuropathy Disability score value > 6 was regarded as abnormal (neuropathy) for detecting Nephropathy urinary albumin- creatinin (ACR) ratio was done. ACR value > 30-299 g/mg was regarded as micro albuminuria, value > 300 g/mg was regarded as clinical albuminuria and value < 30 g/mg was regarded as normal.

Results:

A total number of 100 newly detected type-2 diabetes mellitus subjects admitted or registered in Rangpur Medical college Hospital and Diabetic Somity of Rangpur, were included in this study to find out the frequency of microvascular complications in newly detected type-2 diabetes mellitus. The study subjects were grouped into two groups, Group-A and Group-B. Group-A comprise with microvascular complications (Retinopathy, Neuropathy and Nephropathy) And group-B comprise those without microvascular complications.

The mean age of the study subjects were 53.67± 9.6 (Group-A) years and 44.6±13.71 (Group-B) years. Among the study subjects were 12% male and 8% were female (Group-A) and were 44% male and 36% female (Group -B), BMI 23.84±3.5 (Group-A) and 21.86±4.09 (Group-B) (Table-I).

Table-I: Frequency of sociodemographic characteristics of the study subjects (n=50)

Variables	Group A	Group-B	Total	Mean value of total	p-value
Mean age (years)	53.67±9.6	44.6±13.71	-	49.13	<0.01[s]
Age < 50 years	8(16%)	8(16%)	16(32%)	-	
Age > 50 years	22(44%)	12(24%)	34(68%)	-	
Gender					
Male	6(12%)	22(44%)	28(56%)	-	
Female	4(8%)	18(36%)	22(44%)	-	
Height (cm)	158.8±7.27	158±7.83	-	158.54	
Weight (kg)	60.4±11.68	55.1±13.65	-	57.75	
BMI (kg/m2)	23.84±3.5	21.86±4.09	-	22.85	<0.001[s]

Mean fasting serum blood glucose of 50 study subjects were 272.52±126.7 mg/dl (Group-A) and 247.8±82.02mg/dl (Group-B). Among them mean blood urea was 30.55mg/dl. Out of those with microvascular complications mean blood urea level was 33.55±8.38 mg/dl (Group-A) and those without microvascular complication was 27.5±8.73 mg/dl (Group-B) (Table-II).

Table-II: Frequency of clinical characteristics of study subjects (n=50)

Variables	Group A	Group-B	Mean value	p-value
FBS (mg/dl)	272.52±126.7	247.8±82.02	260.16	<0.001s
Blood urea (mg/dl)	33.6±8.38	27.5±8.73	30.55	<0.001s
Blood Pressure (mm/hg)				
Systolic Pressure	125.67D±15.52	121D±16.83	123.33	
Diastolic Pressure	79D±6.49	79.5D±8.72	79.25	

Among T2DM patients 60% had microvascular complications.

Table-III: Frequency of microvascular complications in the study subjects (n=50)

Variable	Frequency	Percentage	P-value
T2DM with microvascular complication	30	60	<0.001
T2DM without microvascular complication	20	40	
Total	100	100	

In this study 52% T2DM patients were suffering with retinopathy, 24% with nephropathy.

Table-IV: Frequency of different microvascular complications in the study subjects (n=50)

Variable	Frequency	Percentage
Retinopathy	10	20
Nephropathy	26	52
Neuropathy	12	24

In this study 36% patients were presented with combined complications.

Table-V: Frequency of single and combined microvascular complications in the study subjects (n=50)

Variables	Nephropathy alone	Neuropathy alone	Retinopathy alone	Single lesion	Combined lesion	Without microvascular complication
Frequency	10	2	0	12	18	20
Percentage	20%	4%	0%	24%	36%	40%
Total	-	-	-	12(24%)	18(36%)	

Discussion:

The present study was undertaken to observe the frequency of microvascular complications in newly detected type-2 diabetes mellitus patients. A total number of 50 newly detected type-2 diabetes mellitus patients of both sex with age ranging from 18-64 years were considered as study subject.

In this study mean age of 50 study subjects was 49.13 years (Table-I). Those with microvascular complications mean age was 53.67D±9.16 years and those without microvascular complications was 44.6D±13.71 years which was similar with other study done by Dipika et al [15]. The present study also showed that 22(44%) patients with microvascular complications were in age≥50 years and 8(16%) patient were <50 years, which confirm similar findings in other studies in developing countries done by Ramachandran[16]. In our study 22(44%) patients of newly detected type-2 diabetes mellitus patients with microvascular complications were male and 8(16%) female (Table-I) In other study showed that 39% male and 17.25% female were found diabetic with microvascular complications in Neelima aoji[17].

In this study, the mean body Mass Index (BMI) of study subject with microvascular complications a 23.84D±3.5 kg/m^2 was compared to those without microvascular complication which a 21.86D±4.09kg/m^2 (Table-I). Almost similar type result were found by different researcher of different countries like mith[18] and lei et al.[19]

The present study hoed that mean systolic blood pressure of the study subject with microvascular complication a 125.67D±15.52mm of mg and those without microvascular complication was 121D±16.83mm of mg (Table-II). Mean diastolic blood pressure of study subject its microvascular complication was 79D±6.49 mm of Hg and those without microvascular complication was 79.5d±6.49 mm of Hg. This study was similar with previous study of Annemieke et al[11] The mean fasting serum value of the study subject with microvascular complication a 270.62±D 127.7 and those without microvascular complication a 247.8D±82.02 (Table-II) and finding were similar with different previous studies done by Booya et al.[20]

In our study mean blood urea of 50 study subject a 30.55mg/dl. Oe it microvascular complication mean blood urea level a 33.6D±8.38 mg/dl and those without microvascular complication a 27.5D±8.73 mg/dl (Table-II). This findings were similar other study done by Li et al[19].

Among the study subject 30(60%) had microvascular complication and 20(40%) had no microvascular complication at the time of diagnosis (Table-III) this study was nearly comparable with the study of Zhaolan et al.[9] here 50% of newly diagnosed type-2 diabetes mellitus patient had microvascular complication and 50% had no microvascular complication at the time of diagnosis.[20]

In this study, among 50 study subjects 30(60%) had microvascular complication at the time of diagnosis (Table-IV) Out of which 10(20%) had retinopathy, 26(52%) had nephropathy and 12(24%) had neuropathy. This result are comparable with the study of weerasuriya et al[21]. They were found that the retinopathy a 15%, nephropathy a 31% and neuropathy a 10% of the study subjects which was not similar with present study.

Among 50 study subjects 30(60%) had microvascular complication (Table-V). Out of 30 subjects with microvascular complications 12(24%) had ingle microvascular complications and 18(36%) had combined microvascular complications. These findings were similar with the study of Ramachandran[19].

Conclusion:

The present study reconfirm that was substantial proportion of patient which had clinically significant morbidity at the time of diagnosis of type-2 diabetes mellitus. The study showed that even in newly diagnosed type-2 diabetic patient who had more severe hyperglycemia, frequency of microvascular complications was much higher a compared to those who had less severe hyperglycemia. Thus glycemic control doe count even in newly diagnosed type-2 diabetic to prevent and minimize the occurrence of

complication. This underline the urgent need of aggrieve screening for early detection of microvascular complications prevent or retard the progression of complications. Beyond screening, educating patient regarding diabetes related complication must be started to encourage earlier medical consultation.

References:

1. Amir AH.2004. "Targets for treating type 2 diabetes and preventing its complications". P.J.Med.Res, vol.43(2).
2. Lauritzen T, Griffin S, Borch-johnsen K, Wareham NJ, Wolffenbuttel BHR and Rutten G.2000. "Proposed trial of the cost-effectiveness of a multifactorial intervention on morbidity and mortality among people with type 2 diabetes by screening" The international Journal of obesity. Vol.3, pp307-565.
3. Iraj H, Vida R, Sara R, Afsaneh A.2010." Chronic complications of diabetes mellitus in newly diagnosed patients" International journal of diabetes mellitus. Vol. 2, pp61-63.
4. IDF Diabetes Atlas-9 th edition, 2019.htts:// www. Diabetes atlas.org/en.
5. Mayur P, Ina MP, Yash MP and Suresh KP.2011." A hospital based observational study of type 2 diabetes subjects from Gujarat, India". Journal of health population and nutrition. Vol.29(3), pp265-272.
6. Wijesuria MA, De-Abrew WK, Weerathunga A, Perera A, Uasantharajah L. 2011. "Association of chronic complications of type 2 diabetes with the biochemical and physical estimations in subjects attending single visit screening for complications ". Journal of Diabetology.
7. Chawala R.2005."Vascular complication in diabetes- Its clinical evaluation and screening ".RD,vol.25,pp25-33
8. Susan LN, Devan, Christina B and Rongwei F.2008." screening adult for type 2 diabetes". Ann Intern Med. Vol. 148,pp855-68.
9. Zhaolan L, Chaowei F, Weibing W and Bio. 2010. " Prevalence of chronic complications of type 2 diabetes mellitus in outpatient a cross sectional hospital based survey in urban China." Health and Quality of life outcome. Vol. 8, pp62-71.
10. Rajbharan Y, Pramil T and Ethiraj D.2008 "Risk factors and complications of type 2 diabetes in Asians" CRIPS.vol. 9(2), pp8-12.
11. Annemieke M., Spijkerrman, Jacqueline M. Dekker, 2003. "Microvascular complications at time of diagnosis of type 2 diabetes are similiar among diabetic patients detected by targeted screening and patients newly diagnosed in general practice" Diabetes Care 26,2604-2608.
12. Nambuya A, Otim MA,W hite head H et al. The reentation of newly diagnosed diabetic atient in Uganda.QJM 199689(9 705-711.
13. Margoli. Dibetic microvascular complication or overvie. Advanced studie in medicine, vol.5,no.4.260-263,2005.
14. Harris MI, Klein R, Wellborn TA, Knuiman MW. Onset of NIDDM occurs at least 4-7 years before clinical diagnosis. Diabetes care 1992;15:815-19.
15. Dipika Bansal, Kapil Gudala, Hari prasad Esam, Ramya Nayakallu, Raja Vikram vyamusani and Anil Bansali 2014. Microvascular Comlications and Their Associated Risk Factors In Newly Diagnosed Type 2 Diabetes Mellitus patients International Journal Of Chronic Diseases-3.
16. Ramachandran 2007. A. socio-economic burden of diabetes in India. J Assoc.
17. Neelima saoji 2010 A study of frequency of complications at the time of diagnosis of tye-2 diabetes mellitus Originai article,-20-21.
18. Smith AG, Singleton JR. 2013. Obesity and hyerlipidaemia are risk factors for early diabetic complications. Diabetes and its complications 27(5 436-42.
19. Li L, Chen J, Wagng J, et al.2014. prevalence and risk factors of diabetic neuropathy in type -2 diabetes mellitus patients with overweight obese in Guangdong province, China. primary care diabetes,141-5.
20. Booya F, Bandarian F et al.2005. potential risk factor for diabetic neuropathy A case control study. BMC Neurol. 24(52371-75.
21. Weerasuriya N, Siribaddana, S, Dissanayake A, Subasinghe Z, Wariayapola D, Fernando DJ.1998. Long-term complication in newly diagnosed Sri lankan patients with type 2 diabetes mellitus. QJM91439-43.

Original Article

Impact of Iron Supplementation on Cognitive Development in Anemic School-aged Children in Bangladesh

Hossain A[1], Sufian A[2], Bhutan MR[3], Sultana S[4], Sharmin S[5]

Abstract

Background: *Anemia is a prevalent nutritional deficiency among school-aged children in Bangladesh, potentially impacting cognitive development. This study aimed to investigate the association between iron status and cognitive function in anemic school-aged children in Bangladesh.*

Meterials & Methods: *A cross-sectional study was conducted among 350 school-aged children (6–12 years) attending schools in rural and urban Bangladesh. Hemoglobin levels were measured using a portable hemoglobin analyzer, and anemia severity was classified according to WHO criteria. Cognitive function was assessed using Raven's Progressive Matrices and the Digit Span Test. Data on sociodemographic factors, dietary habits, and socioeconomic status were also collected. Descriptive statistics, bivariate analyses, and multivariate regression models were used to analyze the data.*

Results: *The mean age of participants was 9.2 years (±1.8), with 52.3% male children. The majority were anemic, with 45.6% having mild anemia, 30.8% moderate anemia, and 23.6% severe anemia. Cognitive scores decreased with increasing anemia severity, with children in the severe anemia group scoring significantly lower (65.7±13.2) than those without anemia (85.3±12.4). Multivariate regression analysis revealed a significant positive association between hemoglobin levels and cognitive scores ($\beta = 1.85$, $p < 0.001$), while low socioeconomic status was negatively associated with cognitive development ($\beta = -2.35$, $p < 0.001$).*

Conclusion: *This study demonstrated a significant association between iron deficiency and cognitive impairment in anemic school-aged children in Bangladesh. Anemia severity negatively impacted cognitive performance, highlighting the importance of addressing iron deficiency as part of strategies to improve children's cognitive development.*

Keywords: Anemia, Cognitive development, Iron deficiency, School-aged children

1. **Dr. Abir Hossain**
   Assistant Professor, Department of Paediatrics
   Eastern Medical College & Hospital
   Cumilla, Bangladesh
   Mobile: 01741384608
   Email: drabirhossain88@gmail.com
2. **Dr. Abu Sufian**
   Associate Professor, Department of Paediatrics
   Eastern Medical College & Hospital
3. **Dr. Mizanur Rahman Bhuyain**
   Assistant Professor, Department of Paediatrics
   Eastern Medical College & Hospital
4. **Dr. Sharmin Sultana**
   Assistant Professor, Department of Paediatrics
   Eastern Medical college & Hospital
5. **Dr. Shaila Sharmin**
   MPhil Thesis Part, Department of Microbiology
   Dhaka Medical College

For Correspondence

Introduction:

Iron deficiency anemia (IDA) is a prevalent nutritional disorder affecting millions of children worldwide, particularly in low- and middle-income countries. In Bangladesh, the prevalence of anemia among children is alarmingly high, with estimates suggesting that approximately 50% of children aged 6-59 months are anemic.[1] This condition is primarily attributed to inadequate dietary iron intake, poor absorption, and increased physiological demands during periods of rapid growth. Anemia not only compromises physical health but also poses significant risks to cognitive development, which is crucial for academic success and overall well-being.[2] Cognitive development during childhood is a complex process influenced by various factors, including nutrition, environment, and genetics. Iron plays a vital role in brain development and function,

as it is essential for the synthesis of neurotransmitters and myelin, as well as for cellular energy metabolism.[3] Deficiency in iron during critical periods of brain development can lead to long-lasting cognitive deficits, affecting attention, memory, and learning abilitie.s. Studies have shown that children with IDA exhibit poorer cognitive performance compared to their non-anemic peers, highlighting the importance of addressing this nutritional deficiency.[5]

In Bangladesh, the impact of IDA on cognitive development is particularly concerning given the country's socio-economic challenges, including poverty, food insecurity, and limited access to healthcare. The educational system in Bangladesh is already strained, and children suffering from anemia may face additional barriers to learning and academic achievement. Research indicates that anemic children are more likely to experience difficulties in school, including lower grades and higher dropout rates.[6] Therefore, addressing iron deficiency through supplementation could be a critical intervention to improve cognitive outcomes and educational performance among school-aged children.

Iron supplementation has been widely recognized as an effective strategy to combat IDA. The World Health Organization recommends iron supplementation for vulnerable populations, including children, to prevent and treat iron deficiency.[7] Several studies have demonstrated that iron supplementation can lead to significant improvements in hemoglobin levels and overall health status in anemic children.[8] However, the effects of iron supplementation on cognitive development remain a topic of ongoing research. While some studies report positive outcomes, others suggest that the benefits may vary depending on the duration and dosage of supplementation, as well as the baseline nutritional status of the children.[9]

In Bangladesh, limited research has specifically focused on the impact of iron supplementation on cognitive development among anemic school-aged children. This gap in literature underscores the need for targeted studies to evaluate the effectiveness of iron supplementation in improving cognitive outcomes in this population. Understanding the relationship between iron status and cognitive development is crucial for developing effective public health interventions aimed at reducing the burden of anemia and enhancing educational outcomes.

This article aims to explore the impact of iron supplementation on cognitive development in anemic school-aged children in Bangladesh. By synthesizing existing research and presenting new findings, we hope to contribute to the understanding of how addressing iron deficiency can improve cognitive function and academic performance in this vulnerable population. Ultimately, the goal is to inform policymakers and healthcare providers about the importance of nutritional interventions in promoting the health and development of children in Bangladesh.

Meterials & Methods:

This study employed a cross-sectional design to examine the association between iron status and cognitive development in anemic school-aged children in Bangladesh. Data on anemia status, cognitive function, and relevant covariates were collected at a single time point.

The study was conducted in selected schools in both rural and urban areas of Bangladesh, focusing on regions with high anemia prevalence. Schools were selected based on accessibility, student population, and willingness to participate.

The target population comprised school-aged children (6–12 years) attending the selected schools. Children aged 6–12 years enrolled in the selected schools. Consent provided by parents or guardians. Children with chronic illnesses affecting iron metabolism or cognitive function (e.g., thalassemia, sickle cell disease) were excluded. Children currently receiving iron supplements or multivitamins also excluded.

The sample size was calculated to detect significant associations between hemoglobin levels and cognitive development. With a 95% confidence level, 80% power, and an estimated anemia prevalence of 40%, a total of 350 children were included to ensure sufficient statistical power and account for potential non-responses.

Hemoglobin levels were measured using a portable hemoglobin analyzer (HemoCue®). Anemia was classified as mild, moderate, or severe based on WHO thresholds. Cognitive development was assessed using validated tools, including. Raven's Progressive Matrices to measure problem-solving and reasoning. Digit Span Test (from WISC) to evaluate working memory. Trained assessors, blinded to the anemia status of participants, administered these tests. Height and weight were measured using standardized equipment, and BMI was calculated. Nutritional status was classified according to WHO growth standards.

Results:

The study included 350 school-aged children, with a mean age of 9.2 years (±1.8). Slightly more than half of the participants were male (52.3%). The mean hemoglobin level was 10.2 g/dL (±1.1), and most children were categorized as having mild (45.6%) or moderate anemia (30.8%), with 23.6% having severe anemia. The mean BMI of the participants was 16.4 kg/m² (±2.1), and a majority (62.7%) belonged to low socioeconomic status households (TableI-1).

Table-I: Descriptive Characteristics of the Study Population

Variable	Mean±SD/Proportion (%)
Age (years)	9.2±1.8
Gender	
Male	52.30%
Female	47.70%
Hemoglobin Level (g/dL)	10.2±1.1
Anemia Severity	
Mild	45.60%
Moderate	30.80%
Severe	23.60%
BMI (kg/m²)	16.4±2.1
SES (Low Income)	62.70%

Table-II Cognitive scores decreased with increasing anemia severity. Children without anemia had the highest mean cognitive scores (85.3±12.4), while those with mild, moderate, and severe anemia had progressively lower scores of 78.5±10.8, 72.9±11.5, and 65.7±13.2, respectively. These results highlight a clear negative association between anemia severity and cognitive function.

Table-II: Cognitive Scores by Anemia Severity

Anemia Severity	Mean Cognitive Score±SD
No Anemia	85.3±12.4
Mild Anemia	78.5±10.8
Moderate Anemia	72.9±11.5
Severe Anemia	65.7±13.2

Table-III Multivariate regression analysis revealed that hemoglobin levels were significantly and positively associated with cognitive scores (β = 1.85, 95% CI: 1.25–2.45, $p < 0.001$). Age also showed a positive association with cognitive scores (β = 0.78, 95% CI: 0.32–1.24, $p = 0.002$). In contrast, low socioeconomic status was associated with significantly lower cognitive scores (β = -2.35, 95% CI: -3.24 to -1.46, $p < 0.001$). Gender did not show a statistically significant association ($p = 0.098$).

Table-III: Results of Multivariate Regression Analysis

Variable	β Coefficient	95% CI	P-value
Hemoglobin Level	1.85	1.25–2.45	< 0.001
Age	0.78	0.32–1.24	0.002
Gender (Male)	0.65	-0.12–1.42	0.098
SES (Low Income)	-2.35	-3.24– -1.46	< 0.001

Table-IV Subgroup analysis by gender demonstrated similar trends of declining cognitive scores with increasing anemia severity for both males and females. However, females with severe anemia scored slightly lower (64.5±13.6) compared to males (66.9±12.8). Among children without anemia, males had slightly higher cognitive scores (86.1±12.8) than females (84.4±11.9). These findings suggest that the negative impact of anemia on cognitive performance may be slightly more pronounced in females.

Table-IV: Subgroup Analysis of Cognitive Scores by Gender

Anemia Severity	Mean Cognitive Score±SD (Males)	Mean Cognitive Score±SD (Females)
No Anemia	86.1±12.8	84.4±11.9
Mild Anemia	79.6±10.2	77.4±11.5
Moderate Anemia	73.4±11.0	72.5±12.1
Severe Anemia	66.9±12.8	64.5±13.6

Discussion:

The findings of this study underscore the significant impact of anemia on cognitive function among school-aged children, highlighting a concerning public health issue. Our results indicate that cognitive scores decline progressively with increasing severity of anemia, with children without anemia achieving the highest scores and those with severe anemia scoring the lowest. This aligns with previous research that has established a clear link between anemia and cognitive deficits in children.

Anemia, particularly iron-deficiency anemia, has been shown to adversely affect cognitive development and academic performance. A meta-analysis found that children with anemia had lower cognitive scores and poorer educational outcomes compared to their non-anemic peers.[10] Similarly, a study by demonstrated that iron

deficiency, even in the absence of anemia, can impair cognitive function, suggesting that the relationship between iron status and cognitive performance is complex and multifaceted.[11]

Our multivariate regression analysis further supports the notion that hemoglobin levels are positively associated with cognitive scores. This finding is consistent with the work of other study, where it was reported that children with higher hemoglobin levels performed better on cognitive tests.[12] The positive association between age and cognitive scores observed in our study is also supported by existing literature, which indicates that cognitive abilities generally improve with age as children develop more advanced reasoning and problem-solving skills.[13]

The impact of socioeconomic status (SES) on cognitive function is another critical finding of our study. Children from low SES backgrounds exhibited significantly lower cognitive scores, which aligns with the findings of other study , where noted that children from disadvantaged backgrounds often face multiple stressors that can hinder cognitive development.[14] These stressors may include inadequate nutrition, limited access to educational resources, and exposure to environmental toxins, all of which can exacerbate the effects of anemia on cognitive performance.

Interestingly, our subgroup analysis revealed that while both genders experienced a decline in cognitive scores with increasing anemia severity, females with severe anemia scored lower than their male counterparts. This finding suggests that the negative impact of anemia on cognitive performance may be more pronounced in females, a notion supported by another study, which found that girls were more vulnerable to the cognitive effects of anemia than boys. This gender disparity may be attributed to biological differences in iron metabolism or social factors that affect girls' health and nutrition.[15]

Conclusion:

This study underscores the significant impact of anemia on the cognitive development of school-aged children in Bangladesh, where iron deficiency remains a prevalent public health issue. The findings clearly demonstrate that anemia, particularly severe forms, is associated with lower cognitive scores, with children suffering from anemia exhibiting diminished intellectual performance compared to their non-anemic peers.

The results suggest that improving iron status through supplementation and better nutrition could positively affect cognitive development, highlighting the need for targeted interventions to reduce anemia in children. Socioeconomic status was also identified as a key factor influencing cognitive outcomes, with children from lower-income households displaying poorer cognitive function.

Addressing anemia should be a priority in efforts to improve children's cognitive development, especially in rural and low-income urban areas. Interventions should combine iron supplementation with nutritional education and efforts to address socioeconomic barriers.

Overall, the study emphasizes the need for comprehensive public health strategies to reduce anemia and improve the cognitive well-being of children, which will, in turn, enhance their educational outcomes and future opportunities. Further research on the long-term effects of anemia and integrated intervention models is essential to inform future health policies and programs.

References:

1. Kundu S, Alam SS, Mia MA, Hossan T, Hider P, Khalil MI, Musa KI, Islam MA. Prevalence of anemia among children and adolescents of Bangladesh: a systematic review and meta-analysis. International Journal of Environmental Research and Public Health. 2023 Jan 18;20(3):1786.
2. McCann S, Perapoch Amadó M, Moore SE. The role of iron in brain development: a systematic review. Nutrients. 2020 Jul 5;12(7): 2001.
3. Beard JL. Iron biology in immune function, muscle metabolism and neuronal functioning. The Journal of nutrition. 2001 Feb 1;131(2):568S-80S.
4. Bastian TW, Rao R, Tran PV, Georgieff MK. The effects of early-life iron deficiency on brain energy metabolism. Neuroscience Insights. 2020 Jun;15:2633105520935104.
5. Grantham-McGregor S, Cheung YB, Cueto S, Glewwe P, Richter L, Strupp B. Developmental potential in the first 5 years for children in developing countries. The lancet. 2007 Jan 6;369(9555):60-70.
6. Balarajan Y, Ramakrishnan U, Özaltin E, Shankar AH, Subramanian SV. Anaemia in low-income and middle-income countries. The lancet. 2011 Dec 17;378(9809):2123-35.
7. World Health Organization. Guideline daily iron supplementation in infants and children. World

Health Organization; 2016 Feb 9.

8. Gutema BT, Sorrie MB, Megersa ND, Yesera GE, Yeshitila YG, Pauwels NS, De Henauw S, Abbeddou S. Effects of iron supplementation on cognitive development in school-age children: Systematic review and meta-analysis. PLoS One. 2023 Jun 27;18(6):e0287703.
9. Chen Z, Yang H, Wang D, Sudfeld CR, Zhao A, Xin Y, Chen JC, Fawzi WW, Xing Y, Li Z. Effect of oral iron supplementation on cognitive function among children and adolescents in low-and middle-income countries: a systematic review and meta-analysis. Nutrients. 2022 Dec 15;14(24):5332.
10. Hermoso M, Vucic V, Vollhardt C, Arsic A, Roman-Viñas B, Iglesia-Altaba I, Gurinovic M, Koletzko B. The effect of iron on cognitive development and function in infants, children and adolescents: a systematic review. Annals of Nutrition and Metabolism. 2011 Dec 2;59(2-4): 154-65.
11. Beard JL, Connor JR. Iron status and neural functioning. Annual review of nutrition. 2003 Jul;23(1):41-58.
12. Valente LC. Relationships between iron status and measures of attention & memory/by Louie Valente (Doctoral dissertation).
13. Fyfe ER, Evans JL, Matz LE, Hunt KM, Alibali MW. Relations between patterning skill and differing aspects of early mathematics knowledge. Cognitive Development. 2017 Oct 1;44:1-1.
14. Evans GW, Fuller-Rowell TE. Childhood poverty, chronic stress, and young adult working memory: The protective role of self-regulatory capacity. Developmental science. 2013 Sep;16(5):688-96.
15. Repo M. Anaemia and Iron Deficiency in Paediatric Gastrointestinal Diseases: A Focus on Coeliac Disease.

Manuscript Preparation and Submission: Guidelines for Authors

Uniform Requirements for Manuscripts Submitted to RCMC Journal following the guideline of "International Committee of Medical Journal Editors" updated April 2010.

General Principles:

The text of observational and experimental articles is usually (but not necessarily) divided into the following sections: Introduction, Methods, Results, and Discussion. This so-called "IMRAD" structure which is a direct reflection of the process of scientific discovery. Long articles may need subheadings within some sections (especially Results and Discussion) to clarify their content. Other types of articles, such as case reports, reviews, and editorials, probably need to be formatted differently. Authors need to work closely with editors in developing or using such new publication formats and should submit supplementary electronic material for peer review.

Preparation of manuscripts:

Type manuscripts double-spaced in all portions, including the title page, abstract, text, acknowledgments, references, individual tables, and legends. Leave 1-inch margin on all sides with number in every page so that it is possible for editors and reviewers to edit the text line by line and add comments and queries directly on the copy. As a general rule, articles should not exceed 4000 words. Over-length manuscripts will not be accepted for publication.

Title page

The title page should have the following information:

1. Article title: Concise titles are easier to read than long, convoluted ones and should not exceeding 50 characters.
2. Authors' names, highest academic degree, affiliations, and complete address for correspondence including mailing address, telephone number and E-mail address.

Abstract

Structured abstracts are preferred for original research and systematic reviews. The abstract should provide the context or background for the study and should state the study's purpose, basic procedures (selection of study subjects or laboratory animals, observational and analytical methods), main findings (giving specific effect sizes and their statistical significance, if possible), principal conclusions, and funding sources in a running manner and not under separate headings with three to five key words for use as indexing terms. Do not cite references in the abstract. Be concise (250 words, maximum). Limit use of acronyms and abbreviations. Abbreviations must be defined at the first mention. Because abstracts are the only substantive portion of the article, and the only portion many readers read, authors need to be careful that they accurately reflect the content of the article.

The Text

The following are typical main headings: Introduction, Materials and Methods, Results, Discussion and Conclusion.

- **Introduction:** Provide a context or background for the study (that is, the nature of the problem and its significance). The purpose(s) of the study should be clearly stated. Provide only directly relevant references, and do not include data or conclusions from the work being reported.
- **Materials and Methods: I**dentify type of study and describe the study subjects and methods used. Provide methods of statistical analysis. Cite reference(s) for standard study and statistical methods. Describe new or modified methods. Identify apparatus (with name and address of manufacturer) used. Generic names of drugs must be given. Manuscripts that describe studies on humans must indicate that the study was approved by an institutional Ethical Committee and that the subjects gave informed consent.

  Describe statistical methods with enough detail to enable a reader with access to the original data to verify the reported results. When possible, quantify findings and present them with appropriate indicators of measurement error or uncertainty (such as confidence intervals).
- **Results:** Present only important results/ observations in logical sequence in the text, tables or illustrations with relevant statistics. Do not repeat in the text all data in the tables or illustration; emphasize or summarize only

important observation. Use graphs as an alternative to tables with many entries; do not duplicate data in graphs and tables.

- **Tables:** Each table must be typed on a separate sheet and double-spaced. These must be self explanatory. Including data in tables rather than text frequently makes it possible to reduce the length of the text. Do not use internal horizontal or vertical lines. Table should have brief title for each, should be numbered consecutively using Roman numbers and be cited in the consecutive order. Authors should place explanatory matter in footnotes, not in the heading. Explain all nonstandard abbreviations in footnotes, and use the following symbols, in sequence:
- **Illustrations (Figures):** Figures should be either professionally drawn and photographed, or submitted as photographic-quality digital prints. For x-ray films, scans, and other diagnostic images, as well as pictures of pathology specimens or photomicrographs, send sharp, glossy, black-and-white or color photographic prints, usually 127 x 173 mm (5 x 7 inches). Figures should be made as self-explanatory as possible. All photographs, graphs and diagrams should be referred to as figures numbered consecutively in the text in Roman numerals.
- **Units of Measurement:** Measurements of length, height, weight, and volume should be reported in metric units (meter, kilogram, or liter) or their decimal multiples. Temperatures should be in degrees Celsius. Blood pressures should be in millimeters of mercury, unless other units are specifically required by the journal. Authors must consult the Information for Authors of the particular journal and should report laboratory information in both local and International System of Units (SI). Editors may request that authors add alternative or non-SI units, since SI units are not universally used. Drug concentrations may be reported in either SI or mass units, but the alternative should be provided in parentheses where appropriate.
- **Discussion:** Emphasize new and important results and the conclusions that follow including implications and limitations. Do not repeat in detail data or other information given in the Introduction or the Results section. Relate observations to other relevant studies. New hypothesis is appreciated; however they should be clearly labeled as such. Recommendations may be included only when appropriate.
- **Acknowledgments:** All acknowledgements including financial supports should be placed as the last element of the text before references.
- **References:** Rangpur Community Medical College Journal follows the Vancouver system of references which are based on the formats used by the US National Library of Medicine (NLM) in the index medicus. In the text, references should be numbered consecutively as superscript and appear on top of the line after the punctuation. Accuracy of reference data is the author's responsibility.

Verify all entries against original sources, especially journal titles, inclusive page numbers, publication dates. Abstracts may be cited only if they are the sole source and must be identified in the references as "Abstract". "In press" citations must have been accepted for publication and add the name of the journal or book including publisher. Author should follow the style of RCMC Journal to cite reference. Examples of references are given below:

Articles in Journal

1. **Standard journal article**
   a. **List all six authors when six or less:**
   Halpern SD, Ubel PA, Caplan AL. Solid-organ transplantation in HIV-infected patients. N Engl J Med. 2002 Jul 25;347(4):284-7.
   As an option, if a journal carries continuous pagination throughout a volume (as many medical journals do) the month and issue number may be omitted.
   Halpern SD, Ubel PA, Caplan AL. Solid-organ transplantation in HIV-infected patients. N Engl J Med. 2002;347:284-7.
   b. **More than six authors:**
   Rose ME, Huerbin MB, Melick J, Marion DW, Palmer AM, Schiding JK, et al. Regulation of interstitial excitatory amino acid concentrations after cortical contusion injury. Brain Res. 2002;935(1-2):40-6.
   c. **Optional addition of a database's unique identifier for the citation:**
   Halpern SD, Ubel PA, Caplan AL. Solid-organ transplantation in HIV-infected patients. N Engl J Med. 2002 Jul 25;347(4):284-7. PubMed PMID: 12140307.
2. **Organization as author**
   Diabetes Prevention Program Research Group. Hypertension, insulin, and proinsulin in participants with impaired glucose tolerance. Hypertension. 2002;40(5):679-86.
3. **Both personal authors and organization as author (List all as they appear in the byline.)**

Vallancien G, Emberton M, Harving N, van Moorselaar RJ; Alf-One Study Group. Sexual dysfunction in 1,274 European men suffering from lower urinary tract symptoms. J Urol. 2003; 169(6): 2257-61.

4. **No author given**
   21st century heart solution may have a sting in the tail. BMJ. 2002; 325(7357):184.
5. **Volume with supplement**
   Geraud G, Spierings EL, Keywood C. Tolerability and safety of frovatriptan with short- and long-term use for treatment of migraine and in comparison with sumatriptan. Headache. 2002;42 Suppl 2:S93-9.
6. **Issue with supplement**
   Glauser TA. Integrating clinical trial data into clinical practice. Neurology. 2002;58 (12 Suppl 7):S6-12.
7. **Volume with part**
   Abend SM, Kulish N. The psychoanalytic method from an epistemological viewpoint. Int J Psychoanal. 2002;83(Pt 2):491-5.
8. **Issue with part**
   Ahrar K, Madoff DC, Gupta S, Wallace MJ, Price RE, Wright KC. Development of a large animal model for lung tumors. J Vase Intery Radiol. 2002;13(9 Pt 1):923-8.
9. **Issue with no volume**
   Banit DM, Kaufer H, Hartford JM. Intraoperative frozen section analysis in revision total joint arthroplasty. Clin Orthop. 2002;(401):230-8.
10. **No volume or issue**
    Outreach: bringing HIV-positive individuals into care. HRSA Careaction. 2002 Jun:1-6.
11. **Pagination in roman numerals**
    Chadwick R, Schuklenk U. The politics of ethical consensus finding. Bioethics. 2002;16(2):iii-v.
12. **Type of article indicated as needed**
    Tor M, Turkey H. International approaches to the prescription of long-term oxygen therapy [letter]. Eur Respir J. 2002;20(1):242.
    Lofwall MR, Strain EC, Brooner RK, Kindbom KA, Bigelow GE. Characteristics of older methadone maintenance (MM) patients [abstract]. Drug Alcohol Depend. 2002;66 Suppl 1:S105.

Books and Other Monographs

13. **Personal author(s)**
    Murray PR, Rosenthal KS, Kobayashi GS, Pfaller MA. Medical microbiology. 4th ed. St. Louis: Mosby; 2002.
14. **Editor(s), compiler(s) as author**
    Gilstrap LC 3rd, Cunningham FG, VanDorsten JP. editors. Operative obstetrics. 2nd ed. New York: McGraw-Hill; 2002.
15. **Author(s) and editor(s)**
    Breedlove GK, Schorfheide AM. Adolescent pregnancy. 2nd ed. Wieczgrek RR, editor. White Plains (NY): March of Dimes Education Services; 2001.
16. **Organization(s) as author**
    Advanced Life Support Group. Acute medical emergencies: the practical approach. London: BMJ Books; 2001. 454 p.
17. **Chapter in a book**
18. Rashid M. Food and Nutrition. In Rashid KM, Rahman M, Hyder S, editors. Textbook of Community Medicine and Public Health. 4th edn. RHM Publishers; 2004. p. 126-140.
19. **Dissertation**
    Borkowski MM. Infant sleep and feeding: a telephone survey of Hispanic Americans [dissertation]. Mount Pleasant (MI): Central Michigan University; 2002.

Other Published Material

20. **Newspaper article**
    Tynan T. Medical improvements lower homicide rate: study sees drop in assault rate. The Washington Post. 2002 Aug 12;Sect. A:2 (col. 4).
21. **Audiovisual material**
    Chason KW, Sallustio S. Hospital preparedness for bioterrorism [videocassette]. Secaucus (NJ): Network for Continuing Medical Education; 2002.
22. **Dictionary and similar references**
    Dorland's illustrated medical dictionary. 29th ed. Philadelphia: W.B. Saunders; 2000. Filamin; p. 675.

Unpublished Material

23. **In press or Forthcoming** (Note: NLM prefers "Forthcoming" rather than "In press" because not all items will be printed.)
    Tian D, Araki H, Stahl E, Bergelson J, Kreitman M. Signature of balancing selection in Arabidopsis. Proc Natl Acad Sci U S A. Forthcoming 2002.

Electronic Material

24. **CD-ROM**
    Anderson SC, Poulsen KB. Anderson's electronic atlas of hematology [CD-ROM]. Philadelphia: Lippincott Williams & Wilkins; 2002.
25. **Journal article on the Internet**
    Abood S. Quality improvement initiative in nursing homes: the ANA acts in an advisory role. Am J Nurs [Internet]. 2002 Jun [cited 2002 Aug 12];102(6): [about 1 p.]. Available

from: http:// www. nursingworld.org/ AJN/ 2002/june/ Wawatch.htmArticle

26. Monograph on the Internet
Foley KM, Gelband H, editors. Improving palliative care for cancer [Internet]. Washington: National Academy Press; 2001 [cited 2002 Jul 9]. Available from: http www. nap.edu/ books/ 0309074029/html/.

27. Homepage/Web site
Cancer-Pain.org [Internet]. New York: Association of Cancer Online Resources, Inc.; c2000-01 [updated 2002 May 16; cited 2002 Jul 9]. Available from: http://www.cancer-pain.org/.

28. Part of a homepage/Web site
American Medical Association [Internet]. Chicago: The Association; c1995-2002 [updated 2001 Aug 23; cited 2002 Aug 12]. AMA Office of Group Practice Liaison; [about 2 screens]. Available from: http://www.ama-assn.org/ama/pub/category/1736. html

29. Database on the Internet
Open database: Who's Certified [Internet]. Evanston (IL): The American Board of Medical Specialists. c2000 -[cited 2001 Mar 8]. Available from: http://www.abms.org/newsearch.asp
Closed database: Jablonski S. Online Multiple Congenital Anomaly/Mental Retardation (MCA/MR) Syndromes [Internet]. Bethesda (MD): National Library of Medicine (US); c1999 [updated 2001 Nov 20; cited 2002 Aug 12]. Available from:http://www.nlm.nih.gov/ archive// 20061212/mesh/jablonski/ syndrome- title.html

30. Part of a database on the Internet
MeSH Browser [Internet]. Bethesda (MD): National Library of Medicine (US); 2002 - Meta-analysis [cited 2008 Jul 24]; [about 2 p.]. Available from: http : // www. nlm.nih.gov/ cgi/ mesh/ 2008/ MB_cgi? mode=& index=16408 & view=c oncept MeSH Unique ID: D017418.

31. Blogs
Holt M. The Health Care Blog [Internet]. San Francisco: Matthew Holt. 2003 Oct - [cited 2009 Feb 13]. Available from: http:// www.t hehealtheareblog.com/ the_health_car e_blog/. Kidney Notes.com [Internet]. New York: Kidney Notes. c2006 - [cited 2009 Feb 13]. Available from: http://www.kidneynotes.com/.Wall Street Journal. HEALTH BLOC: WSJ's blog, on health and the business of health [Internet]. Hensley S, editor. New York: Dow Jones & Company, Inc. c2007 - [cited 2009 Feb 13]. Available from: http://blogs.wsj.com/health/.

Submission of manuscripts

Papers are accepted for publication with an understanding that they are submitted solely to the Journal of Rangpur Community Medical College. Statements and opinions expressed in the papers, communications and letter herein are those author(s) and not necessarily those of editor or publisher. Three hard/ printed copies in A4 size paper should be sent to the editor. In addition, an electronic/ digital version of the article composed in MS word should be submitted in a CD. Manuscript submission on email instead of disc is allowed.

Authorship:

Authorship must be clearly stated and in order of descending frequency depending on the contribution on the paper. No gifted, guest or ghost authorship is allowed and this will be treated illegal. The authors must state clearly their contribution, conflict of interest, financial involvement if any and sign the letterhead individually. They also must state that this paper is not send to any other journal in any form for publication.

Reviews and action:

Manuscripts are usually examined by the editorial staff and are sent to outside reviewers. Author's suggestion regarding the names of possible reviewers is encouraged, but editorial board reserves the right of final selection.

Proofs:

Correspondence and proofs for correction will be sent to communicating unless otherwise stated. Author should check the proof carefully. Changes or additions to the manuscript are not allowed at this stage.

Under taking:

We the undersigned, give an undertaking to the following with regard to our article entitled …… ……
……
submitted for publication in the RCMC Journal.

1) The article mentioned above has not been already published or submitted for publication in any form, in any other journal.
2) We also agree to the authorship of this article in the following sequence.

Author's name

1) ……
2) ……
3) ……

All correspondence should be sent to:
Editor-in-Chief
RCMC Journal
Rangpur Community Medical College
Medical East Gate, Rangpur
email: principal@rcmcbd.com
Tel: +88-0521-53881-2,
Fax: +88-0521-61114

RANGPUR COMMUNITY MEDICAL COLLEGE JOURNAL
(RCMC JOURNAL)

Rangpur Community Medical College
Medical East Gate, Rangpur
email: principal@rcmcbd.com
Tel: +88-0521-53881-2, Fax: +88-0521-61114

RCMC Journal is Recognized by Bangladesh Medical and Dental Council (BM&DC)