

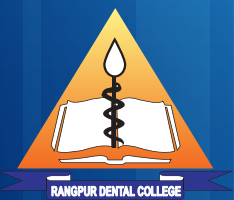
ISSN 2310-6530

RANGPUR DENTAL COLLEGE JOURNAL

Vol: 5

January 2017

No: 1



Official Publication
of
Rangpur Dental College



RANGPUR DENTAL COLLEGE JOURNAL

(Recognized by Bangladesh Medical & Dental Council)

Vol. 5, No. 1, January 2017

Official Publication of Rangpur Dental College
Medical East-Gate, Dhap, Rangpur, Bangladesh

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Published by: Dr. Md. Shahidul Islam
Rangpur Dental College, Medical East-Gate, Dhap, Rangpur-5400, Bangladesh.

Printed by: United Printers, Rangpur, Bangladesh. Phone: 01915-458055

Rangpur Dental College Journal

Vol. 5, No. 1, January 2017

CONTENTS

Editorial

- **Hyaluronic Acid Injections for the Treatment of Temporomandibular Joint Osteoarthritis** 01
Siddik ANM M

Original Article

- **Clinical Pattern of Juvenile Idiopathic Arthritis Presented at Dhaka Shishu Hospital, Dhaka** 03
Miah M, Hoque KZ, Sultana AT, Paul SP, Alam MZ
- **Oxidative Stress Status in Rheumatoid Arthritis Patients Before and After Treatment with Methotrexate and Nsaids** 08
Pervin F, Habib MA, Ahmed N, Hoque MA, Sardar MMR, Mahmuda S
- **Morphologic Characteristics of Root Canal of Mandibular Lateral Incisors in Rajshahi Population: An In-vitro Study** 12
Hossain MI, Parveen M, Chowdhury MOR, Uddin MF, Alam MS, Sarker S, Rahman MZ
- **A Comparative Study on Services of Emergency Department of Public & Private Hospital - Service Providers & Service Receivers Perspective** 17
Rahman MM, Sultana N, Kabir MS, Rubby MG
- **A Vivo Study on Dowel Crown with More Adaptable Fiber Reinforced Composite Post System** 22
Hasan H, Hasan MH, Akbar T, Siddik ANMM, Alam MS
- **Red Blood Cell Indices in Rural and Urban Women of Reproductive Life** 26
Akhter S, Sarker CR, Ahmed N
- **Reconstruction of Temporomandibular Joint with Costochondral Graft in Children: A Prospective Study** 30
Alam AKMS, Rahman QB, Hakim F, Hossain MA, Pramanik JK

Review Article

- **Prevalence of Gestational Diabetes Mellitus (GDM) In The World - A Systematic Literature Review** 37
Haque MR

Case Report

- **Retreatment of Furcal Perforation with Portland Cement: A Case Report** 41
Shanta NK, Bashir AKM, Sheikh AH

- Reviewers of Articles in this Issue** 44

Hyaluronic Acid Injections for the Treatment of Temporomandibular Joint Osteoarthritis

Siddik ANM M¹

Tempomandibular joint can frequently affect different type of arthritis, like Infectious arthritis, traumatic arthritis, rheumatoid arthritis, secondary degenerative arthritis and osteoarthritis. Alternative diagnostic terms are as- arthritis deformans, degenerative arthritis, arthrosis, osteoarthrosis, Degenerative joint disease. The most common form of arthritis is osteoarthritis. It is the end point of long standing TMJ dysfunction. It is a chronic disease, characterized by- Pain, stiffness, grating and crepitus on the joint area, increasing disability and slow degradation of joint cartilage.

The disease can have an impact on several aspects of patient's life, including- functional and social activities, relationships, socio-economic status, body image and emotional well-being. X-rays or CT may show- Flattening-27%, Osteophytes-27%, Erosions-13%, Sclerosis-9%.

Pathophysiology of osteoarthritis (OA): Loss of articular cartilage, Imbalance between matrix synthesis and cartilage degradation, reduction in the elastic and viscous properties of the synovial fluid. The molecular weight and concentration of the naturally occurring hyaluronic acid decreases. Loss of elastoviscous of the cavity, Decreases the lubrication and protection of the joint tissue, Degeneration and subsequent erosion of cartilage.

Hyaluronic Acid (HA): HA or Sodium Hyaluronate is a high molecular weight polymer made up of repeating disaccharide units of N-acetylglucosamine and Sodium glucuronate linked by beta 1-3 and beta 1-4 glycosidic bonds. It is supplied in disposable glass syringe. Each of which contains 20mg (10mg/ml) of sodium hyaluronate.

Effects of Hyaluronic acid in OA: Enhanced endogenous HA synthesis, Increased synthesis of chondroitin sulfate, Suppressed PG release from cell matrix layer, Decreased PG release from cartilage matrix, Protected extracellular matrix from degradation, Reduced levels of leukotriene,

Stimulated cAMP production, Suppressed production of TNF-alpha, Decreased plasminogen activator activity and antigen, Reduced arachidonic acid release, Reduced NO production, Exhibited antioxidant effects, Protected cells from damage due to hydroxyl radicals, Inhibited cartilage degradation associated with neutrophil adhesion, Prevented cartilage damage, Maintained normal morphology and smoothness, Accelerated migration of synovial cells and chondrocytes.

Intra-articular injection technique: The treatment consisted of two intra-articular injection 14 days apart. The needle punctures anatomy as like as other TMJ arthroscopic area. Disinfection of pre-auricular area, 1ml of 2% Xylocaine with adrenaline, Anesthetized from the skin to the TMJ capsule, Using a 23 gauge (0.6mm) needle with 0.7-1 ml of Sodium Hyaluronate, Administration of the injection with an interincisal opening approximately 20mm.

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Clinical Pattern of Juvenile Idiopathic Arthritis Presented at Dhaka Shishu Hospital, Dhaka

Miah M¹, Hoque KZ², Sultana AT³, Paul SP⁴, Alam MZ⁵

Abstract:

Background: Juvenile Idiopathic Arthritis (JIA) is a disease that shows wide variation in different populations. The International League of Associations for Rheumatology (ILAR) classification has been used all over the world for delineate JIA disease characteristics in various population. **Objective:** The present study was undertaken to see the JIA profile in Bangladeshi children. **Materials & Methods:** A total of 52 children diagnosed as JIA as per the ILAR 2001 criteria were the study sample. Data were collected using a semi-structured questionnaire containing the variables of interest which among others included demographics, disease subtype, and routine blood results. A doubly-anchored horizontal 100 mm visual analogue scale (VAS) was used for the assessment of the child's overall wellbeing and a doubly-anchored horizontal 100 mm VAS for the assessment of the intensity of the child's pain. **Results:** Majority (80.8%) of the children was diagnosed as having JIA at the age of 5 - 10 years. The mean ages at onset and presentation of the disease were 7.5 and 7.9 years respectively. A male predominance was observed in the series. The predominant JIA subtype was rheumatoid factor (RF) negative polyarthritis (42.3%) followed by oligo-persistent (25%) and RF positive polyarthritis (11.5%). Oligo-extended and systemic onset JIA each comprised of 7.7%. Enthesitis-related arthritis (ERA) was rare (5.8%). Disease activities of the children at presentation showed that the mean intensity of pain on VAS was 35.8(range: 25-50) mm. Children's overall well-being on VAS, was on an average 25.2(range: 20-40) mm. The mean numbers of active joints and number of limited joints were 4.0(range: 2-8) and 2.0(range: 0-4) respectively. The mean ESR was 82.3(range: 35-135) mm. **Conclusion:** The present study revealed a different JIA profile compared to other international JIA studies. JIA was predominant in male children. RF negative polyarthritis is more common followed by olig-persistent. ERA was seldom observed.

Key words: Juvenile Idiopathic Arthritis, Subtype, Clinical features etc.

Rangpur Dent. Coll J 2017; 5(1): 3-7

Introduction:

Juvenile Idiopathic Arthritis (JIA) is the most common chronic arthritis in children worldwide. According to the International League of Associations for Rheumatology (ILAR),¹ JIA is defined as arthritis that begins before the 16th birth anniversary and persists for at least 6 weeks,

provided other conditions being excluded². It is not a single disease entity but a heterogeneous group of chronic arthritic disorders of unknown cause in children. JIA is an important cause of short and long term disability in children with decreased daily function and quality of life^{3,4}.

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The ILAR classification has, in recent years, been used all over the world to delineate JIA disease characteristics in various populations and nationalities. Included in these recent studies are large multicentre trials and smaller studies from both developed and developing countries⁵⁻⁹. Studies in developed countries have estimated a prevalence of JIA that varies between 0.07-4 per 1000 children^{10,11}. Reports on the incidence and prevalence of JIA suggest variability among different ethnic and geographically distinct populations^{12,13}. As evidence increasingly shows, it is likely that JIA prevalence is underestimated.

In Bangladesh, rural people and urban slum dwellers have poor access to tertiary level or specialized healthcare, and as such, accurate magnitude of the disease is not available. The first large community-based study (carried out among 16,270 children who were selected by multistage sampling technique from a community of approximately 1,05,986 children in the Narayanganj district, Bangladesh between November 2008 to December 2009) published in 2012 showed that the prevalence of JIA was 60.5 per 100,000 children in rural area with girl to boy ratio being 2.3:1.0. The subgroup distribution showed oligoarticular JIA in the majority of patients (60%)¹⁴. A hospital-based study conducted in Bangabandhu Sheikh Mujib Medical University (BSMMU) between July 2007-December 2012 by Islam et al demonstrated that a total of 540 patients of arthritis were enrolled during the study period. Of them JIA was predominant (77%) followed by SLE (10%), vasculitis (6.7%) (which comprised of Henoch Shonlein purpura (HSP), polyarteritis nodosa, Kawasaki Disease and other rare varieties of juvenile arthritis)¹⁵. As these variations may provide insight into the cause of JIA, there is substantial interest in the differences in JIA in various parts of the world. The present study is conducted to find the pattern of JIA in the urban setting of a tertiary care hospital.

Materials & Methods:

This descriptive study was conducted in Dhaka Shishu Hospital & Bangladesh Institute of Child Health over a period of 2 and a half years between July 2014 to December 2016. Prior to study Ethical clearance was obtained from Ethical Review Committee of the Institute. The children diagnosed as JIA as per the ILAR 2001 criteria were the study population. Only those patients whose parents gave written consent to participate in the study were enrolled. Data were collected using a semi-structured questionnaire containing the variables of interest which among others included demographics, disease subtype, and routine blood results. Blood tests were

done only if necessary for routine medical care and previous relevant blood results were collected from the case notes. It was not routine to perform blood tests for Anti-nuclear antibody (ANA), rheumatoid factor (RF) or Human leukocyte antigen B27 (HLAB27) at every visit due to resource limitations. ANA test was only done (using ELISA method) in children who presented with oligoarthritis, HLAB27 was only done in those with other features of enteritis-related arthritis (ERA), and RF was done only in children with polyarthritis.

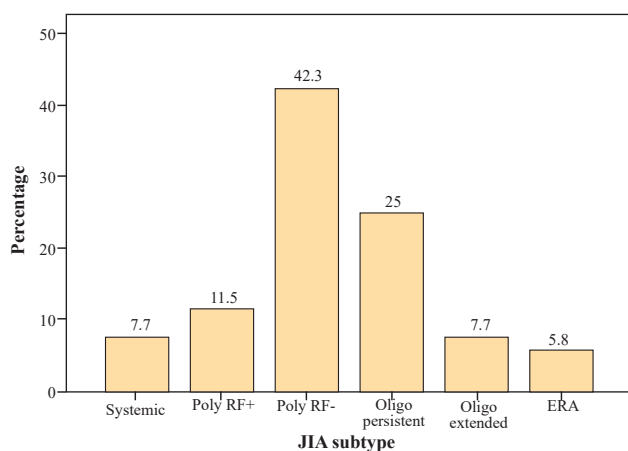
A doubly-anchored horizontal 100 mm visual analogue scale (VAS) was used for the assessment of the child's overall wellbeing (with anchors of '0 = very well' and '100 = very poor') and a doubly-anchored horizontal 100 mm VAS for the assessment of the intensity of the child's pain (with anchors of '0 = no pain' and '100 = very severe pain')⁵. The CHAQ is a well validated international tool and has been used in many recent JIA trials¹⁶. Data were analyzed using SPSS (Statistical Package for Social Sciences), version 17 and test statistics used to analyse the data were descriptive statistics. While the categorical data were presented as absolute number and percentage, the continuous data were presented as mean/median and standard deviation (SD) from the mean.

Result:

Majority (80.8%) of the children was diagnosed as having JIA at the age of 5 - 10 years and only a few cases below the age 5 years. The mean ages at onset and presentation of the disease were 7.5 and 7.9 years respectively. Males outnumbered females roughly by 3:2. Over half (53.8%) of the children at presentation had been suffering from the disease for 6 or < 6 months and 42.3% for 7-12 months. Only 2(3.8%) children had disease duration of >12 months (table I). Fig 1 shows the subtypes of JIA in our series. The predominant JIA subtype was rheumatoid factor (RF) negative polyarthritis (42.3%) followed by oligo-persistent (25%) and RF positive polyarthritis (11.5%). Oligo-extended and systemic onset JIA each comprised of 7.7% and enthesitis-related arthritis (ERA) 5.8% of the cases. Disease activities of the children at presentation are illustrated in Table II. The mean intensity of pain measured in visual analogue scale (0-100 mm) was 35.8 (range: 25-50) mm. Children's overall well-being, also measured in VAS (0-100 mm), was on an average 25.2 (range: 20-40) mm. The mean number of active joints and number of joints with restricted movement were 4.0 (range: 2-8) and 2.0 (range: 0-4) respectively. The mean ESR was 82.3 (range: 35-135) mm.

Table I: Distribution of children by their demographic characteristics (n = 52)

Demographic characteristics	Frequency	Percentage	Mean \pm SD (range)
Age at presentation (years)			
< 5	02	3.8	
5– 10	42	80.8	7.9 \pm 2.8 (4-15)
>10	08	15.4	
Age at onset (years)			
---	---	---	7.5 \pm 2.6 (4-15)
Sex			
Male	30	57.7	---
Female	22	42.3	---
Duration of illness (months)			
6	28	53.8	7.6 \pm 4.4 (2-23)
7-12	22	42.3	
> 12	02	3.8	

**Fig 1:** The subtypes of JIA**Table II:** Distribution of patients by their disease activities at presentation (n = 52)

Disease activities	Mean	SD	Range
Pain VAS (0-100 mm)	35.8	7.6	25-50
General VAS (0-100 mm)	25.2	6.7	20-40
Number of active joints	4.3	1.6	2-8
Number of limited joints	1.8	0.8	0-4
ESR (mm)	82.8	24.4	35-130

Discussion:

The main purpose of our study was to describe the clinical features of children with JIA presented at our center as

understanding the clinical characteristics of this disease and its subtypes in our country is essential to provide a better planning for medical care. In our study the mean ages at onset and presentation of the disease were 7.5 and 7.9 years respectively. In most of the studies^{5,7-9} except the Turkey's study there is wide difference (a minimum of 3 years) between the age at onset and age at presentation, which might be due to delayed referral from the primary care physicians or financial constraint and/or lack of awareness on the part of the patients' guardians. However this study finds an average delay of only 4 months between the onset and first presentation at tertiary centres. It might be that there is no referral system in our health care setting and seeking specialized health care is at the discretion of the patients concerned. A male predominance was observed in our study, which is quite consistent with the findings of Indian and Turkey's studies,^{8,9} but sharply contrasts with those of Gutierrez-Suarez et al.⁵ A study conducted in South Africa by Weakley et al,¹⁷ however, showed no sex differential in the occurrence of JIA.

The present study shows that predominant subtype of JIA was RF negative polyarthritis (42.3%). Islam et al in a similar study in another tertiary hospital of Bangladesh also found polyarthritis JIA to be the highest. However, Shafiq and colleagues in a population-based study demonstrated oligoarthritis variety to be the highest (60%). The difference between the pattern of JIA between the previous population-based and the present hospital-based study might be that poly-arthritis cases being severe frequently seeks care from specialized hospital making its over representation in hospital-based study. The occurrence of RF negative polyarthritis subtype in the present study is highest compared to all other relevant studies^{5,7-9,17,18}, conducted around the world. A limitation that must be mentioned in the present study is that the ILAR criteria require at least 2 positive RF assays to be done at least 3 months apart in the first 6 months of the disease in order to diagnose RF positive polyarthritis¹. Due to resource constraints, obtaining of 2 RF titers is not standard practice in our setting, and one assay was considered sufficient to classify a patient with polyarthritis into positive or negative. This has been a difficulty with the ILAR classification, especially in poorly resourced settings. This difficulty is mentioned in the Indian study⁸ and in a study of Nordic children¹⁹. Thus we believe that the RF negative polyarthritis patients may be overestimated in our polyarticular subtype as a child with one positive assay was classified as RF positive or negative polyarthritis without repeating the test for confirmation.

The second most common arthritis in the present study was persistent oligoarthritis (25%). This is in line with the previously described data that showed that non-European populations have a decreased relative risk of suffering from oligoarthritis²⁰. This may be a true reflection of a decreased prevalence or it may reflect that these patients have less obviously severe disease and would be underrepresented in a tertiary centre. The oligoarthritic children may do comparatively well in the community and may not feel to go to a higher centre for better treatment.

The prevalence of ERA was only 5.8%, which is much lower than that found in Weakley's study (23%) and almost half than that reported in Turkish study (10.3%), but almost close to that reported in a recent UK longitudinal cohort study (7%)^{6,9}. The Indian study however, so far reported the highest rate ERA (36.0%)⁸. The large PRINTO series states that there were too few a number of ERA patients, so they were excluded from further consideration⁵. The ERA has been described as being more prevalent in Asian populations including Indian populations^{8,20}. It is less frequently observed in Black population. But it is more prevalent in the Western Cape region of South Africa, where a unique mix of population is found with a higher prevalence of coloured people (44%) compared to Black people (34.9%)²¹. The coloured population has mixed ancestry with some Asian and European heritage which may explain for the high levels of ERA. Very few patients were classified as systemic (7.7%) and extended oligoarthritis (7.7%). None had psoriatic or undifferentiated arthritis which may be a reflection of small sample size or hospital-based study.

Conclusions:

The present study revealed a different JIA profile compared to other international JIA studies. JIA was predominant in male children. RF negative polyarthritis is more common than has been described elsewhere. The second most common subtype was olig-persistent. There is a lower rate of ERA. However, our study is limited by sample size and hospital-based study. There are difficulties with the ILAR classification in our setting, specifically regarding the requirement of 2 rheumatoid factor tests to make the diagnosis confirm.

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Oxidative Stress Status in Rheumatoid Arthritis Patients Before and After Treatment with Methotrexate and Nsaids

Pervin F¹, Habib MA², Ahmed N³, Hoque MA⁴, Sardar MMR⁵, Mahmuda S⁶

Abstract:

Background: Oxidative stress is a condition when there is an imbalance between endogenous production of oxidants like free radicals and anti-oxidants. Oxidative stress might play a significant role in the pathogenesis of Rheumatoid arthritis. Traditional therapies of Rheumatoid arthritis are by different NSAIDs like Indomethacin, Naproxen, Ibuprofen. However, addition of Methotrexate to NSAID have been found to be extra benefit by halting the disease process. **Objective:** The study was therefore performed to evaluate the oxidative stress status before and after treatment with Methotrexate and NSAIDs in Rheumatoid arthritis patients. **Methodology:** The study was done in the department of Pharmacology and Therapeutics, Rajshahi Medical College. Ten clinically diagnosed Rheumatoid arthritis patients were included in the study. Plasma Malondialdehyde (MDA) levels of those diagnosed patients was measured before and after treatment with Methotrexate and NSAIDs for two months by spectrophotometer. **Results:** Before starting treatment, The MDA levels of those patients were 3.92 ± 1.47 micro-mol/liter. After two months of continuous treatment with Methotrexate and NSAIDs, the MDA level decreased to 2.40 ± 1.10 micro-mol/liter. This decreased level was statistically significant ($p < 0.05$). **Conclusion:** Treatment with Methotrexate and NSAIDs not only improve clinical symptoms but also reduce oxidative stress status in Rheumatoid arthritis patients.

Key words: Oxidative stress status, Rheumatoid Arthritis, Methotrexate, NSAIDs

Rangpur Dent. Coll J 2017; 5(1): 8-11

Introduction:

Rheumatoid arthritis (RA) is a chronic multi-system disease of unknown etiology characterized by non specific inflammation of peripheral joints with joint swelling, morning stiffness, destruction of articular tissue and joint deformities. It affects nearly one percent of the population world wide¹. The endogenous free radicals produced in the body are neutralized by endogenous antioxidants. If this balance is disturbed, it can produce oxidative stress². This state of oxidative stress may perpetuate tissue damage in inflammatory disease like RA³. RA is treated with conventional therapies like non steroidal anti-inflammatory drugs (NSAIDs) such as indomethacin,

naproxen, ibuprofen and disease modifying anti-rheumatic drugs (DMARDs) such as methotrexate, sulphasalazine, hydroxychloroquine etc⁴. Methotrexate (MTX) is currently the most widely prescribed DMARD in RA due to its high efficiency and rapid onset of action. Although MTX was first introduced as an anti-proliferative agent that inhibits nucleotides synthesis for therapy of malignancies, in RA, it seems probable that it's anti-inflammatory effect is more important than it's anti-proliferative effect⁵. It is believed that many DMARDs affect oxidative stress, although there has been insufficient research to confirm such a relationship⁶.

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NSAIDs are commonly used for the treatment of RA. NSAIDs suppress inflammation in rheumatoid arthritis. It blocks prostaglandin synthesis by blocking cyclo-oxygenase enzyme⁷. Recently a study suggested that NSAIDs have been associated with antioxidant property and improve the circulating antioxidants status on daily dosing in different inflammatory conditions⁸. All these evidences suggest that using either MTX or NSAIDs possesses beneficial effect in RA patients. Besides, combination of MTX and NSAIDs may have potentiating effect. Thus the usefulness of combination of these two drugs in RA could not be ignored. So the aim of the study is to evaluate any improvement of oxidative stress status in Rheumatoid arthritis patients after combined treatment with Methotrexate and NSAID

Methods:

This quasi-experimental study was carried out in the department of Pharmacology and Therapeutics, Rajshahi Medical College during the period of January 2011 to December 2011. Ten clinically diagnosed adult Rheumatoid arthritis patients of both genders were enrolled in the study by using the criteria of American Rheumatism Association (ARA). Study subjects were selected by following purposive sampling technique from Rajshahi Medical College Hospital and the protocol of the study was approved by the Ethical Review Committee (ERC) of Rajshahi Medical College. All the subjects were free from Diabetes, Hypertension, Chronic liver and renal disease, Alcoholism and Smoking. Persons taking antioxidant therapy or DMARD before the study were excluded from the study. Before recruitment, aim, benefit and procedure of the study was explained and informed written consent was taken from each study subject. Thorough physical examination of all subjects was done. Then under aseptic precaution, 4 ml blood was taken from each subject in a test tube containing anti-coagulant di-potassium EDTA. Plasma was separated after centrifuging for 15 minutes at 3000 rpm and plasma Malondiladehyde (MDA) levels were estimated. Then patients were given oral Methotrexate (10 mg weekly) and NSAID (Indomethacin 150 mg daily in 3 divided doses) for two months. After two months, blood samples were taken again from each subject and plasma MDA levels were estimated.

Measurement of MDA:

Half ml plasma was mixed with 2.5ml of 20% trichloroacetic acid and after 10 min; the sample was centrifuged (3500×g for 10 min). The precipitate was

washed with sulfuric acid (0.05mol/liter) and treated in a test tube with 2.5ml of sulfuric acid and 3ml of thiobarbituric acid (TBA) reagent (2.0gm TBA/l in 2mol sodium sulfate/liter). The test tube was placed in boiling water bath for 30 min and cooled in running tap water. The TBA reactive material was mixed with 4ml n-butanol and centrifuged (3500×g for 10 min). A standard of MDA was treated similarly. The optical density (O.D) of n-butanol extract of plasma and MDA standard was measured at 532 nm against a butanol blank by spectrophotometer. The result was expressed as $\mu\text{mol MDA/liter}$ of plasma (Das et al., 1990)⁹.

Data was analyzed by computer using SPSS software program. Statistical analysis was done by paired t-test. P value less than 0.05 was taken as significant.

Result:

After combined treatment with methotrexate and indomethacin for two months, the MDA level of ten clinically diagnosed Rheumatoid arthritis patients was decreased. This decreased level was statistically highly significant ($P < 0.001$).

Table I: MDA level in patients of Rheumatoid Arthritis before and after treatment with Methotrexate and Indomethacin (n = 10)

Number of patients	MDA level $\mu\text{mol/l}$		P value
	Before treatment (BT)	After treatment (AT)	
1	08	05	BT vs AT <0.001
2	03	2.3	
3	3.5	02	
4	04	1.1	
5	04	1.6	
6	3.5	03	
7	3.5	2.5	
8	3.2	1.3	
9	3.3	2.6	
10	3.2	2.6	
Mean \pm SD	3.92 \pm 1.47	2.40 \pm 1.10	

The significance of difference before and after treatment was calculated using student's paired t-test

Discussion:

Rheumatoid arthritis is a chronic, systemic inflammatory disease that is characterized by progressive joint destruction¹⁰. Cells (neutrophils, macrophages, lymphocytes) found in inflammatory joints are capable of producing oxygen derived free radicals and may cause oxidative damage¹¹. A recent study indicated that increased oxidative stress and/or defective antioxidant status contribute to the pathology of Rheumatoid arthritis¹². Treatment of RA is a major health problem. This disease is treated with NSAIDs such as indomethacin, naproxen, ibuprofen etc. Addition of DMARDs such as methotrexate, sulphasalazine, chloroquine etc. to NSAIDs have added advantages in protecting progressive joint destruction⁴. So the objective of the present study was to assess the combined effect of Methotrexate and Indomethacin on the status of oxidative stress in Rheumatoid arthritis patients.

Direct measurement of free radicals is difficult due to their unstable and transient nature; therefore the tendency of free radicals to cause lipid peroxidation has been used as an indirect measure. Malondialdehyde (MDA) is a three carbon, low molecular weight aldehyde that can be produced from free radical attack on polyunsaturated fatty acids of biological membranes¹³. The determination of MDA is used for monitoring lipid peroxidation in this study. In the present study, we have found that plasma MDA levels were significantly decreased in Rheumatoid arthritis patients after combined treatment with Methotrexate and Indomethacin for two months. This finding is compatible with several researchers¹⁴⁻¹⁶.

Shahin et al., (2011) and Mohammad et al., (2003) reported that serum MDA level was decreased significantly after treatment with MTX in arthritic rats as a model for Rheumatoid arthritis^{17,18}. These findings are also in accordance with the present study.

It may be due to the fact that Methotrexate's principal mechanism of action at low doses used in rheumatic diseases probably related to inhibition of polymorphonuclear chemotaxis. It has effect on dihydrofolate reductase and this affects lymphocyte and macrophage function. MTX thereby reduces the inflammatory cells induced oxidative stress⁷. Moreover, MTX is known to suppress the IL-6 induced generation of ROS in synoviocytes of RA patients. ROS production in fibroblast like synoviocytes (FLSs) was increased significantly by interleukin-6, and it's effect was abrogated in presence of MTX¹⁹. In addition, recently it has become clear that many of the anti-inflammatory effects of MTX are mediated by adenosine²⁰. Adenosine inhibits the

generation of superoxide anion by stimulated monocyte and also inhibits nitric oxide production by macrophages probably via A2B receptor²¹. Additionally, Indomethacin causes inhibition of chemotaxis, down regulation of interleukin-1 production, decreases production of free radicals and superoxides and produces anti-inflammatory effect in RA⁷. All these events cumulatively result in relief of the oxidative stress and inflammatory damage in Rheumatoid arthritis patients by methotrexate and indomethacin. One of the strength of the study is that we have measured MDA which is one of the most reliable and reproducible marker that provides a correct assessment of the extent of oxidative stress status. However the sample size of the study was small. So further study with larger number of patients should be done to confirm our findings.

Conclusion:

From the observation and results of the present study, it is revealed that combined treatment with methotrexate and indomethacin for two months decreased the oxidative stress status without any intervention of antioxidants. However this findings suggest the need for designing more clinical trials to find out the impact of methotrexate and indomethacin on the status of oxidative stress in different stage of disease activity for the treatment of rheumatoid arthritis either alone or in combination.

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Morphologic Characteristics of Root Canal of Mandibular Lateral Incisors in Rajshahi Population: An In-vitro Study

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Abstract:

Background: A detailed understanding of the morphology of the root canal system is an essential prerequisite for successful management of endodontic cases. Adequate chemomechanical preparation and effective filling of the root canal system are based on knowledge of normal root canal morphology and variations from the norm obtained from studies of root and canal morphology. **Aim:** To investigate the root canal morphology of mandibular lateral incisors in a Rajshahi population using a canal staining and tooth-clearing technique.

Materials and Methods: One hundred and sixty extracted mandibular lateral incisors, collected from dental Unit Rajshahi Medical College within Rajshahi, were selected for this study. Following pulp tissue removal, the teeth were decalcified with 5% nitric acid, dehydrated with ascending concentrations of alcohol and rendered clear by immersion in methyl salicylate. After staining of the canal systems with India ink, cleared teeth were examined under 5X magnification and the following features were evaluated: (i) number and type of root canals; (ii) presence and location of lateral canals and intercanal communications; (iii) location of apical foramina. **Results:** The majority of mandibular incisors had a single canal (64.37% of teeth possessed a Type I canal system). Although 35.63% of the roots possessed two canals, only 11.87% had two separate apical foramina. **Conclusions:** The prevalence of two canals in Rajshahi population of mandibular lateral incisors was 35.63% and is within the range of previous studies performed on populations of different racial origin.

Key words: Canal staining, Mandibular incisors, Morphology, Root canal, Vertucci's classification

Rangpur Dent. Coll J 2017; 5(1): 12-16

Introduction:

A detailed understanding of the morphology of the root canal system is an essential prerequisite for successful management of endodontic cases. Adequate chemomechanical preparation and effective filling of the root canal system are based on knowledge of normal root canal morphology and variations from the norm obtained from studies of root and canal morphology¹. Many of the problems encountered during root canal treatment occur

because of inadequate understanding of the pulp space anatomy. Studies on the internal and external anatomy of teeth have shown that anatomic variations can occur in all groups of teeth and can be extremely complex². This applies to mandibular incisor teeth as well, as many dentists fail to recognize the presence of a second canal. Current knowledge of pulp space anatomy is based on research findings and individual case reports. Many studies have examined the root canal systems of mandibular incisors.

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Rankine-Wilson & Henry (1965) filled the root canals of mandibular anterior teeth with radio-opaque material, sectioned them in a horizontal plane, and exposed radiographs³. They reported two canals in 40.5% of mandibular incisors. Later, Vertucci (1974) used the clearing technique to study the root canal morphology of 300 extracted mandibular anterior teeth⁴. Two canals were found in 30% of mandibular central incisors and in 25% of mandibular lateral incisors. Mauger et al. (1998) evaluated the canal morphology at different root levels in one hundred mandibular incisors and reported that 98-100% of the teeth had one canal in the area 1-3 mm from the apex⁵. There is a lack of consistency in the reported prevalence of second canals in mandibular incisors^{2,6-10}. The differences may be related to study design (in vivo versus ex vivo), technique of canal identification (radiographic examination, sectioning and clearing) or to racial divergence^{7,9-10}.

It is well established that the failure to treat all the canals effectively leads to poor endodontic outcomes¹¹⁻¹³. The morphology of the root canal systems of mandibular incisor teeth may be different depending on the population¹⁴⁻¹⁸. Previous studies have shown that a high percentage of mandibular incisor teeth have more than one root canal. The incidence of mandibular incisor teeth with more than one canal has been reported to range from 11.5% to 50%^{15,19}. The variations in mandibular incisor teeth may result in missing root canals, nonsurgical endodontic treatment failure, and a need for surgical procedures.

It is important to be familiar with variations in tooth anatomy and characteristic features in various racial groups, since such knowledge can aid location and negotiation of canals, as well as their subsequent management. Additionally, a number of studies have shown different trends in shape and number of roots and canals amongst the different races^{2,7,20-22}. These variations appear to be genetically determined and are important in tracing the racial origins of populations^{21,23}. Descriptions of the frequently occurring root canal systems of permanent teeth are based largely on studies conducted in Europe and North America, and relate to teeth of mainly Caucasian origin.

These descriptions may not be fully applicable to teeth of non- Caucasian origin. There are no published reports on the root canal anatomy of mandibular incisors in Rajshahi population. Clearing techniques, cross sections, and radiographic evaluations have been used in studies that evaluated the root canal morphology of mandibular incisor teeth,^{14,15,17}. Kartal and Yanikoglu,¹⁵ and Sert and Bayirli

used clearing technique and evaluated the mandibular incisors using a microscope. Bellizzi⁸ and Hartwell¹⁷ conducted a clinical in vivo study and evaluated the root canal systems on mandibular incisors using radiographs.

In the study by Karagoz-Kucukay,²⁴ the frequency of root canal ramifications in mandibular incisors was evaluated at 30 magnification after a low-temperature injection of thermoplasticized gutta-percha. The purpose of this study was to examine the root canal morphology of mandibular incisors in a Jordanian population using a canal staining and root clearing technique.

Material and Methods:

A total of 160 extracted mandibular lateral incisors were randomly collected from Dental Unit Rajshahi Medical within Rajshahi, Northern area of Bangladesh. Teeth included in this study had intact clinical crowns and fully developed apices. Immature or resorbed apices teeth were excluded from the study.

All teeth were placed in 5.25% sodium hypochlorite (Organo Bio tech laboratories Pvt Ltd New Delhi, India.) for 30 minutes, after which any remaining external tissue or calculus were removed by scaling. The external surface of the collected teeth was examined for developmental groove or bifurcations. Access cavities were prepared with a high-speed handpiece and pulp tissue was dissolved by immersing the teeth in 5.25% sodium hypochlorite for 24 hours. Teeth were washed under running tap water for 2 hours and dried overnight. India ink (Sanford Rotring GmbH, Hamburg, Germany) was injected into the pulp chamber with an endodontic irrigating syringe with gauge 27 needle (BU Kwang Medical Inc., Seoul, Korea).

The ink was drawn through the canal system by applying negative pressure to the apical end of the tooth with the use of a central suction system. Excess ink was then removed from the surface of the tooth with gauze soaked in alcohol. The stained teeth were air dried and decalcified with 5% nitric acid (Analytical reagents 69-71%; Gainlad Chemical Co., Clwyd, UK) for 3 days. The acid solution was changed daily and the endpoint of decalcification determined by periodic radiography. The teeth were washed under running tap water overnight and then air dried. The specimens were then dehydrated in ascending concentrations of ethyl alcohol (70%, 96% and 99%) for 12 hours each. Finally, transparent specimens were obtained by immersing the dehydrated teeth in methyl salicylate solution (Regent Chemicals, Mumbai) into which teeth were stored until examined.

The specimens were examined using 5X magnification with magnifying glass and photographed using a digital camera. The canal configurations were categorized into the first five types of Vertucci's² classification as follows:

- **Type I:** A single canal present from the pulp chamber to the apex.
- **Type II:** Two separate canals leave the pulp chamber, but join to form one canal to the site of exiting.
- **Type III:** One canal leaves the pulp chamber, divides into two within the root, and then merges to exit in one canal.
- **Type IV:** Two separate and distinct canals are present from the pulp chamber to the apex.
- **Type V:** Single canal leaving the pulp chamber but dividing into two separate canals with two separate apical foramina.

Result:

The transparent specimens were examined using X5 illuminated magnifying glass, and the number and type of root canals were recorded. The canal configurations of mandibular lateral incisors that were found in this study were type I to type V according to Vertucci's classification.

Results are summarized in tables I-IV. All teeth had one root. Table I shows the number and percentage of each canal type in the mandibular lateral incisor teeth. Out of 160 teeth, 103 (64.37%) had a single canal. Although 57 teeth (35.63%) of the roots possessed two separate canals, only 11.87% had two separate apical foramina (Types IV and V).

Table I: Number and percentage of canal system types in mandibular lateral incisors (n = 160)

Type	Number of samples	Percentage
I	103	64.37
II	9	5.62
III	29	18.12
IV	15	9.37
V	4	2.5
	Total 160	100%

Table II shows the number and percentage of lateral canals and intercanal communications as well as position of lateral canals. Lateral canals were present in only 10.62% of roots. There was an increasing prevalence of lateral canals towards the apical third of the root with approximately 64.70% occurring in the apical part of the roots.

Table II: Number and percentage of roots with lateral canals (n =160)

	Number of samples	Percentage
Roots with Lateral canals	17	10.62
Coronal	2	11.76
Middle	4	23.52
Apical	11	64.70
	Total 17	100%

Table III describes the frequency of roots with centrally and laterally located foramina as well as frequency of apical deltas. More than half of the roots (61.87%) had centrally located foramina.

Table III: Number and frequency of roots with central and lateral foramina and roots (n = 160)

Location of apical foramen	Number of samples	Percentage
At Apex	99	61.87
Buccal	36	22.5
Lingual	17	10.62
Proximal	8	5
	Total 160	100%

Table IV: described the Intercanal Communications were found in 20 teeth (12.5%) and apical deltas were observed in only eight teeth (1.8%).

	Number of samples	Percentage
Intercanal Communications	20	12.5
Apical delta	6	3.75

Discussion:

Various methods have been used to study root canal morphology including radiographic examination,⁶ root sectioning,¹⁴ staining and clearing techniques,²⁵ direct observation with microscope,²⁶ sectioning and macroscopic observation,²⁷ stereo microscope,²⁸ spiral computed tomography,²⁹ and cone beam computed tomography,^{30,31}. Vertucci,² used the clearing technique to study the root canal morphology of extracted mandibular anterior teeth. It has been reported that fine details of the root canal system can be visualized by staining and clearing²⁵. This technique also makes canal negotiation with instruments unnecessary, thereby maintaining the original form and relation of canals, and provides a three- dimensional view of root canal².

It has been reported that fine details of the root canal system can be visualized by staining and clearing and this method was used in the present study³². The literature on mandibular incisors reveals that 11-68% of mandibular incisors possess two canals, although in many of these cases, the canals merge into one in the apical 1-3 mm of the root^{2,9,14,15,18}. Vertucci² examined the root canal morphology of 300 mandibular anterior teeth and reported a second canal in 27.5% of mandibular incisors. Miyashita et al.,¹⁸ reported that 12.4% of mandibular incisors contained two canals; however, only 3% had two foramina. Sert et al.,⁹ noted that two canals were present in 68% of mandibular central incisors. Mauger et al.,¹⁴ evaluated the canal morphology at different root levels in one hundred mandibular incisors, and reported that 98-100% of the teeth had one canal in the area 1-3 mm from the apex. The differences between these morphology studies may be related to variations of examination methods, classification systems, sample sizes and ethnic background of tooth sources. In a study in Jordanian population, it was found that 73.8% of the mandibular incisors possessed a single root canal, and 26.2% of teeth were with two canals³³.

This study examined the root canal morphology of extracted mandibular incisors collected from dental unit, Rajshahi Medical College, Rajshahi within north Bangladesh. Therefore, the sample may not be fully representative of the Bangladeshi population. However, root canal morphology may not vary in a young nation of the same ethnic origin. Therefore, the data presented in this paper is expected to apply to the Bangladeshi population.

The results of the present study indicate that about one third 57 teeth (35.63%) of the study samples had two canal systems. Out of 160 study teeth, 103 (64.37%) had a single canal (type I). Only 11.87% had two separate apical foramina (Types IV and V). Of the teeth with two canals, Type III configuration was most common followed by Type IV, Type II and Type V. Therefore, the frequency of two canals in the present study was within the range of previous reports. To recognize the presence of the second canal and the need for access cavities to have appropriate inciso-gingival extension to facilitate the location of lingual canals.

The apical foramen was found to coincide with the apical root tip in 61.87% of teeth. This is higher than reported in previous studies that demonstrated that the apical foramen coincided with the anatomical apex in 17-46% of cases^{9,34,35}. This finding may be of significance in working length determination which often depends on the average

position of the apical constriction relative to root apex. In the present study, lateral canals were observed in around 10.62% of teeth and were found most frequently in the apical third of the canal. This is consistent with the findings of Miyashita et al.¹⁸ however, much lower than that reported by Vertucci.⁵ Intercanal communications were found only 12.5% of all the teeth. Apical delta was seen in around 3.75 % of the teeth. This requires an individualized procedure for preparation and filling in each of these conditions to obtain the most desirable results.

Conclusion:

Within the limitations of the present study, it can be concluded that overall, 35.63% of mandibular lateral incisors in this Rajshahi, Bangladeshi population had two canals. In the teeth with two canals, the Type III canal system was the most prevalent followed by Type IV and II. Type V was the East prevalent.

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A Comparative Study on Services of Emergency Department of Public & Private Hospital- Service Providers & Service Receivers Perspective

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Abstract:

Background: Emergency department (ED) is an integral part of the hospital. The reputation of a hospital rests to a large extent on the service of emergency department. **Objectives:** To evaluate the situation of ED of public and private hospital according to service receivers and service providers perspective which includes the opinion about different services, recommendations for further improvement of ED, availability of facilities according to Standard Operating procedure(SOP). **Methodology:** A comparative cross sectional study in between ED of public and private hospital was conducted during the period of January to December 2014, with 150 sample population where 60 were service receivers (patients and attendance) and 15 service providers (doctors, nurses) from each hospital. Data were collected through semi structured questionnaire and checklist on the light of SOP district level hospital. Data analysis was done with SPSS (Version 21) software on the basis of different variables. **Results:** The study result revealed that, the mean age of respondents was 38.2 (\pm 10.7) years and 39.4 (\pm 9.9) years in public and private hospitals respectively. About opinion of service receivers regarding different services provided in ED, more than one third (38.3%) were highly satisfied regarding physical facilities in public hospital, where as in private hospital it was (61.7%). About doctors' dealings, supporting staff dealings, over all management of ED- in public hospital it was observed that 36.7%, 35.0%, 30.0% service receivers were highly satisfied respectively. These percentages were quite high in private hospital in comparison with public hospital. Though the percentages of satisfaction about different services provided in ED by service receivers were quite similar in both public and private hospital, but the percentages of dissatisfaction was quite high in public hospital than private hospital. Almost similar problems were faced by the service providers in both public and private hospitals which includes shortage of manpower; instrument; lack of security. Recommendations for further improvement of ED, both in public and private hospital emphasized by service providers on to increase instrument and manpower; to arrange training program regularly. According to SOP all physical facilities were available in both hospitals except two, which were absent in public hospital. Out of 19 emergency drugs, 4 were absent in public hospital and 3 were absent in private hospital; about diagnostic facilities according to SOP, all were available but in both hospitals X-ray facilities for emergency patients were not round o'clock. **Conclusion:** However, specific problems identified by different stakeholders need to be critically appraised by the authority to improve the services further.

Key words: Emergency, Emergency Department, Standard Operating Procedure.

Rangpur Dent. Coll J 2017; 5(1): 17-21

Introduction:

Emergency department (ED) of hospitals is often the point of major public interest and is the most vulnerable to

criticism. The reputation of a hospital rests to very large measures on two important factors i.e. the Emergency and Out patient department (OPD).

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ED is primarily meant for the immediate medical attention and resuscitation of seriously ill patients. ED is expected to provide care for any patient, at any time and under any reasonable circumstances¹. The quality and efficient delivery of patient care in ED depend on a variety of interrelated elements, such as prompt off loading of ambulance patients, quick and accurate triage (that is, the process of prioritizing patients according to the urgency of their illness or injury), nurse and/or physician assessment, diagnostic and laboratory services, consultations with specialists, and treatment. A patient's length of stay in the emergency department depends on the timeliness of each part of the process, as well as on the ready availability of further care, such as an in-patient hospital bed if the patient needs to be admitted². The emergency medical service also encompasses the role of moving patients from one medical facility to an alternative one; usually to facilitate the provision of a higher level or more specialized field of care but also to transfer patients from a specialized facility to a local hospital or nursing home when they no longer require the services of that specialized hospital, such as following successful cardiac catheterization due to a heart attack^{3,4}. The aim of this study was to evaluate the situation of ED of public and private hospital according to service receivers and service providers perspective which includes the opinion about different services, recommendations for further improvement of ED, availability of facilities according to SOP.

Materials and Methods:

This comparative cross sectional study was conducted in ED of Shaheed Suhrawardy Medical College Hospital and Holy Family Red Crescent Medical College Hospital, public and private hospital respectively in Dhaka city during the period of January to December 2014. One hundred and fifty subjects were selected as respondents for the study. Among them, 60 were service receivers (patients or patient attendants) and 15 were service providers (doctors, nurses) from each hospital. Non- probability purposive sampling technique was used for data collection and data were collected through face to face interview administered questionnaire and facilities of ED were observed through check list. During data collection, opinion about different services provided in ED, the respondents were asked to give their opinion for excellent services as highly satisfied, good services as satisfied, average services as poorly satisfied and bad services as satisfied. A questionnaire was developed and pre tested for necessary modification and finalization. Then the master tabulation sheet was prepared

after proper checking, verifying and editing as per specific objectives and key variables. Analysis of data was finally done with Statistical Package for Social Science (SPSS) software (version 21) of computer on the basis of difference variables. Then the data presentation was perfectly done by MS Word and MS Excel. Prior permission was taken from the concerned authorities. Verbal consent was taken from the respondents. Confidentiality and anonymity of the respondents was maintained.

Results:

Table I: Socio demographic characteristics of the respondents.

Socio demographic characteristics	Public Hospital	Private Hospital
Age (in years)		
Mean (\pm SD)	38.3 (\pm 10.7)	39.4 (\pm 9.9)
Category of the respondents	n (%)	n (%)
Service providers (Doctor, Nurse)	15 (20.0)	15 (20.0)
Service receivers (Patients or attendance of patients)	60 (80.0)	60 (80.0)
Total	75 (100.0)	75 (100.0)
Sex of the respondents	n (%)	n (%)
Male	51 (68.3)	46 (61.6)
Female	24 (31.6)	29 (38.3)
Total	75 (100.0)	75 (100.0)
Religion of the respondents	n (%)	n (%)
Islam	66 (88.3)	63 (85.0)
Hindu	9 (11.6)	12 (15.0)
Total	75 (100.0)	75 (100.0)

Table I revealed that the mean age of the respondents was 38.3 (\pm 10.7) years and 39.4 (\pm 9.9) years in public hospitals and private hospitals respectively. The categories of the respondents were 15 (20.0%) service providers and 60 (80.0%) service receivers in both hospitals; 51 (68.3%) and 46 (61.6%) respondents were male in public and private hospitals respectively; 66 (88.3%) , 63 (85.0%) respondents were Muslim in public and private hospital respectively.

Table II: Distribution of the service receivers according to their opinion about different services in ED.

Opinion about different services provided in ED		Highly satisfied	Satisfied	Poorly satisfied	Dissatisfied	Total
		n (%)	n (%)	n(%)	n(%)	n(%)
Physical facilities	Public	23(38.3)	17(28.3)	4(6.7)	16(26.6)	60(100.0)
	Private	37(61.7)	14(23.3)	1(1.6)	8(13.3)	60(100.0)
Doctors dealings	Public	22(36.7)	11(18.3)	13(21.6)	14(23.3)	60(100.0)
	Private	40(66.7)	9(15.0)	10(16.6)	1(1.6)	60(100.0)
Supporting stuff dealings	Public	21(35.0)	13(21.7)	14(23.3)	12(20.0)	60(100.0)
	Private	41(68.3)	7(11.7)	9(15.0)	3(5.0)	60(100.0)
Overall management of ED	Public	18(30.0)	11(18.3)	19(31.6)	12(20.0)	60(100.0)
	Private	33(55.0)	11(18.3)	15(25.0)	1(1.6)	60(100.0)

Table II shows that 16 (26.6%), 23 (38.3%) service receivers were dissatisfied, highly satisfied respectively about physical facilities of ED in public hospital, where as 8(13.3%), 37(61.7%) were dissatisfied, highly satisfied respectively in private hospital. In public hospital doctors dealings, supporting staff dealings, overall management of ED highly satisfied were found 22 (36.7%), 21 (35.0%), 18 (30.0%) respectively; where as in private hospital about these services highly satisfied were found 40(66.7%), 41(68.3%), 33 (55.0%) respectively.

Table III: Distribution of the service receivers according to their recommendations regarding improvement ED of the hospital

Recommendations for improvement of ED	Public hospital	Private hospital
	n (%)	n (%)
To improve cleanliness	46 (76.7)	28 (46.7)
To increase doctors and nurses	42 (70.0)	48 (80.0)
Behavioral improvement of service providers	11 (18.3)	9 (15.0)

Multiple responses

Table III shows in public hospital 46(76.7%) service receivers recommended to improve cleanliness, which was 28(46.7%) in private hospital. Other recommendations by service receivers for further improvement of ED were to increase doctors and nurses, behavioral improvement of service providers in both public and private hospital.

Table IV: Distribution of the service providers according to their recommendations regarding improvement ED of the hospital.

Recommendations for improvement of ED	Public hospital	Private hospital
	n (%)	n (%)
To increase instruments and manpower	15 (100.0)	15 (100.0)
To arrange training program regularly	6 (40.0)	7 (46.7)
To increase security	15 (100.0)	10 (66.7)

Multiple responses

Table IV shows in public hospital 15(100.0%) service receivers recommended to increase instruments, manpower and security, where as in private hospital

7(46.7%)recommended to arrange training program regularly for further improvement of ED.

Table V: Distribution of the service providers according to their statement about problem faced during duty

Problems faced during duty	Public hospital	Private hospital
	n (%)	n (%)
Shortage of instrument	15 (100.0)	12 (80.0)
Lack of manpower / Overloaded work	15 (100.0)	10 (66.6)
Lack of security	12 (80.0)	12 (80.0)

Multiple responses

Table V shows in public hospital 15(100.0%) service providers mentioned about the problem shortage of instrument, lack of manpower / overloaded work where as in private hospital 12 (80.0%), 10 (66.6%) mentioned about that problems respectively.

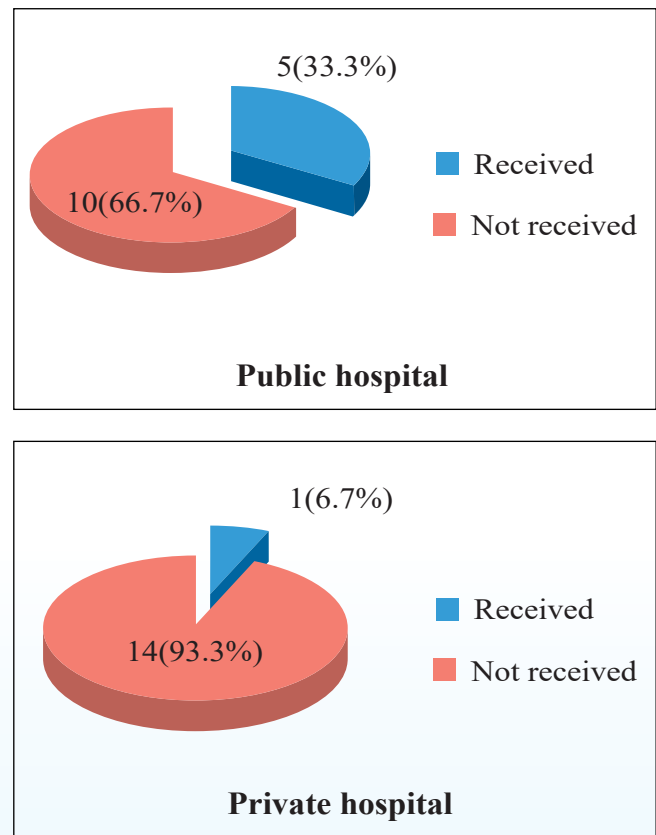


Fig I: Distribution of emergency management training received by service providers.

Figure I shows in public hospital 5(33.3%) service providers received emergency management training; where as in private hospital 1(6.7) received emergency management training.

Discussion:

Emergency department as well as the services rendered by the department is one of the most important part of the hospital and also vulnerable to criticism. Evaluation by service providers and service receivers' perspective is important for gap findings. The study result revealed that among the study respondents the age (mean \pm SD) was 38.3 \pm 10.7 years and 39.4 \pm 9.9 years in public hospital and private hospital respectively. Male respondents were more than half (68.3%) and (61.6%) in public and private hospitals respectively (table I). It was found that 10 (66.7%) service providers had not emergency management training in public hospital, where as 14 (93.3%) service providers had not emergency management training in private hospital (Fig I). Poor portion of service providers had emergency management training in both hospitals, but better scenario was observed in public hospital in comparison with private hospital. About opinion of service receivers regarding different services provided in ED, more than one third (38.3%) were highly satisfied regarding physical facilities in public hospital (table II). About doctors' dealings, supporting staff dealings, over all management of ED- in public hospital it was observed that 36.7%, 35.0%, 30.0% service receivers were highly satisfied respectively. These percentages were quite high in private hospital in comparison with public hospital (table II). Again it was noticed that the percentages of satisfaction about different services provided in ED by service receivers were quite similar in both public and private hospital.

But the percentages of dissatisfaction about different services were quite high in public hospital than private hospital. In a cross sectional study in Bangladesh conducted by Reshma et al. 2016⁷ in ED of public hospital it was showed that about overall management of ED 88.4% service receivers were satisfied and 2.5% were dissatisfied. The percentages of dissatisfaction regarding this was quite close to the findings of private hospital in this study, but the percentages of satisfaction was quite high in that study in comparison with present study result in both hospitals; again according to that study opinion of service receivers regarding service provided by the service providers highly satisfied was 32.2%, which was quite close to public hospital of present study scenario, but in private hospital that percentage is quite high and the percentages of dissatisfaction of service receivers regarding service provided by the service providers that study showed 3.3%, but in present study scenario of dissatisfaction in doctors dealing, supporting staff dealing was 1.6%, 5.0% respectively in private hospital-which was quite similar

with that study findings. But in public hospital of present study that percentages are quite high. Another study by Dharmendra (2013)¹ on "Management of emergency services and care of patients in corporate hospital of Ahmedabad" showed about overall management of ED 80% patients and relatives were highly satisfied, 19 % were satisfied and 1% was poorly satisfied, which was close to this study result. Though the percentage of highly satisfaction of service receivers about overall management of ED in both public and private hospital was quite less than that of the study finding, but others were close to. Both the service providers and service receivers recommended for further improvement of ED to increase manpower in both public and private hospital. That means authority should focus carefully in this point to fulfill the demand and further improvement in both sector. Among other recommendations by service receivers it was found that more than three fourth (76.7%) mentioned to improve cleanliness in public hospital, where as this percentage was quite low (46.7%) in private hospital in comparison with public hospital. Almost similar problems were faced by the service providers in both public and private hospitals. In both recommendations and problems faced by the service providers in public hospital emphasized on shortage of instrument and manpower.

From the findings of the check list the ED of both the public and private hospital was well equipped. Most of the facilities were present in ED of both hospitals, except sufficient waiting room, sufficient toilet facilities and availability of adequate number of bed in public hospital. According to SOP all physical facilities were available in both hospitals except telephone and emergency trolley- which were absent in public hospital. According to SOP, 19 emergency drugs had been listed, out of them 4 drugs were not available in public hospital which were Inj. Mg Sulphate, Inj.Pathedine, Inj.Quinine, Tab. Tri-nitroglycerine and 3 drugs Inj. Antihistamine, Inj.Pathedine, Inj.Quinine were not available in private hospital at that time.

About diagnostic facilities according to SOP, all facilities were available in both hospitals except X-ray facilities for emergency patient round o'clock. According to the findings of the study conducted by Ferdous et al (2014)⁵, in Dhaka medical college emergency department all necessary equipments for the management of all emergencies were available but not adequate and the equipments available is of poor quality. The supporting services were also inadequate, similar reflection observed in public hospital of this study.

Conclusion:

Based on the findings of the present study, it can be concluded that both the public and private hospitals ED was well equipped, almost all the requirements were fulfilled according to SOP. It was observed that a noticeable number of service receivers were dissatisfied about the overall management of ED in public hospital, where as this percentage was quite minimum in private hospital- which should be considered by the authority of public hospital. The recommendations by service receivers and service providers need to be carefully scrutinized to fulfill the gap in both public and private hospital. However specific problems identified by different stakeholders need to be critically appraised by the authority to improve the services of ED further.

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A Vivo Study on Dowel Crown with More Adaptable Fiber Reinforced Composite Post System

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Abstract:

Background: Patients having grossly carious tooth with broken down crown are needed to be restored with post & core after endodontic treatment. Root canal posts are widely used & come in a variety of metals & forms. However, cast metal posts, although better than other post & core systems, still possess some disadvantages; Retention failure may also occur in case of metal post as the cast metal post & core become heavier & may cause lack of adaptation and cementation failure. These problems are overcome with the recently introduced post & core material. The fiber reinforced composite post & core material is a superior & efficient alternative to cast post. **Purpose:** The purpose of this study was to investigate the success of fiber reinforced composite post & core system over conventional metallic system in regard adaptation on post treated tooth. **Materials & Methods:** This was a prospective study, conducted in the department of Conservative Dentistry & Endodontics, B.S.M.M.U. Forty patients were selected purposively who attended in this department with grossly carious tooth with badly broken crown without apical infection as the subject of this study & divided in two groups. Twenty patients were included in group A as case subjects & they were treated with fiber reinforced post & core system. Twenty patients were included in group B as control subjects. They were treated with conventional cast metallic post & core system. After twelve months, recorded data were compiled on a master chart and statistically analyzed. Chi-square test and t-test (unpaired) were done for statistical significance ($P < 0.05$). **Results:** Highly significant difference ($p < .01$) were observed between the groups regarding adaptation. **Conclusion:** This study revealed that fiber reinforced composite post & core system can overcome the problems faced by the metallic post & core system. So it can be concluded that fiber reinforced composite post & core system can be a promising alternative in comparison to metallic post & core system.

Key words: Dowel crown, Fiber reinforced composite post, Adaptation

Rangpur Dent. Coll J 2017; 5(1): 22-25

Introduction:

Grossly carious teeth with badly broken crown are often seen in our daily dental practice. Most of these patients are willing to conserve their tooth by any means. It is also the challenge of the endodontists to preserve those badly broken tooth rather than extraction. But unfortunately in many cases often not much tooth structure is left in the coronal portion to hang the crown. In this reason we need to do a special kind of filling into the root of tooth after root

canal treatment, is called post. That is firmly embedded in the remaining portion of the tooth and is not dislodged later when it is prepared as a core for retaining the crown. Preparation of a crown by using the retention and stability from the post and core is called dowel crown¹. Different types of available procedures for dowel fabrication are followed worldwide but not all the procedures ensure sound and prolong prognosis of a dowel crown with good esthetic

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and function. Longevity of a tooth restored with dowel crown depends on adaptation and cementation of post with tooth, retention of post, resistance of root fracture and development of any apical lesion due to any micro leakage. All these criteria's for good prognosis can be achieved by selecting a proper design of post with employing correct geometry and extension of ferrule. So, an appropriate post design is very essential for longevity of a tooth restored with dowel crown². Prior to begin the clinical procedure for a single crown or fixed partial denture, some important characteristics should be assessed for the fabrication of a post & core. One of these characteristics is the selection of the type of posts. They may be cemented/bonded post or threaded posts. Cemented posts depend on their close proximity to prepared dentinal walls & the cementing medium.

Examples are custom cast posts & cores & a variety of prefabricated design. The prefabricated design includes parallel sided metal post, such as Para Post or different types of threaded posts. Examples of threaded posts are Kurer Post, Dentatus, and Flexi Post etc. Recently, posts made of fiber reinforced composite polymers (Ribbond, Fiberkor Post System, Composopost, Snow Post System) have been introduced. Esthetic version of these posts has a quartz exterior that makes the post tooth colored. Fiber reinforced posts are made of a woven polyethylene fiber system, that is coated with dentin bonding agent & packed into the canal, where it is then light polymerized in position³. Therefore, although the custom cast post systems are still to be highly appreciated & dependent systems in dowel crown, the recent advancement of the dowel system by using the fiber reinforced composite post & core material have advantages in some of the desired criteria of dowel crown over the custom cast post.

Methods:

The study was conducted in the department of Conservative dentistry & endodontics, Faculty of Dentistry, BSMMU, with purposive sampling based on the patients having grossly carious teeth with badly broken crown. Forty diagnosed subjects were included in this study. Out of 40 subjects 20 were designated as case, who were treated with fiber reinforced composite post & core system, and 20 were designated as control, who were treated with conventional cast metal post & core system. The age range of this study subjects was 22-48 years for case group & 20-49 years for control group. The mean age of case & control were 34.25 ± 6.414 & 34.45 ± 6.909 respectively. Among cases 12 were male & 8 were female. In the control group 11 were

male & 9 were female. Crown of tooth was prepared by removing residual caries, any weak restoration or thin unsupported enamel was removed. Remaining tooth was prepared as usual. A sub-gingival facial shoulder and lingual chamfer were placed. A 60 degree bevel was prepared around the occluso-axial line angle to create core ferrule for cast post. Pulp chamber was prepared by removing all filling material from the pulp chamber and cleaned the chamber. When composite post is used, undercuts & irregularities in pulp chamber will help to retain the core material. Undercuts in the pulp chamber were blocked out with filling material or eliminating by removing the tooth structure without weakening the tooth. Root canal preparation was done by a passo-reamer to remove the root canal filling material from the root canal.

Before removing the GP, the appropriate length of the post was calculated from radiograph and a rubber stop was placed perpendicular to the shaft of the passo-reamer. The length and the diameter of canal preparation should be at least 2/3 length of root and 1/3 width of root respectively. A radiograph was taken to ensure proper length and width of the prepared canal. The canal is enlarged in size using the rotatory instrument that corresponds to the final dimension of the selected post. The post should fit passively in to the post space without substantial movement. At least the apical half of the post should fit closely to the preparation. The coronal half of the post may not fit as well because of root canal flaring. However, this lack of adaptation can be corrected when the core material is placed around the cemented post. Care must be taken not to remove more dentin at the apical extent of the post space than is necessary. Radiographic confirmation is important to ensure proper seating and length of the post. The incisal/occlusal end of the post are shortened, so it does not interfere with the opposing occlusion, but it must provide support and retention for the restorative core material.

The post is cemented in to the root canal by using resin bonding procedure. Restorative material is then condensed around the post or bonded to the post and remaining tooth structure. A slight excess of material is placed and this is removed during crown preparation. After root canal preparation a custom made post can be fabricated from a direct procedure and an indirect procedure and invested for casting. After casting the post and core was inserted in to the canal with gentle pressure to check any interference before full seating, due to casting defect glass ionomer cement was used for cementation of post. The definite tooth preparation is then completed & impression is made for crown.

Results:

Table I: Distribution of patients by evaluation of adaptation (n=40)⁴

Groups	Grade -I (number)	Grade -II (number)	Grade -III (number)	Chi - square value	P-value
Case n=20	20	0	0	13.33	<0.01(hs)
Control n=20	10	05	05		

Chi-square test was done as the test of significance, *p<.01= highly significant

In table I & fig I, evaluation of adaptation between case & control was being done. Among the case group all (100%) patients were in grade I, on the other hand 10 (50%), 5 (25%), & 5 (25%) patients were in grade I, II & III respectively & there was highly significant difference in between case & control regarding adaptation of post & core.(p<.01)

Grade - I : Good adaptation

(No difference in the gap between both the x-ray).

Grade - II : Average adaptation

(Difference in gap is less than 0.01 mm).

Grade - III : Poor adaptation

(Difference in gap is more than 0.01mm).

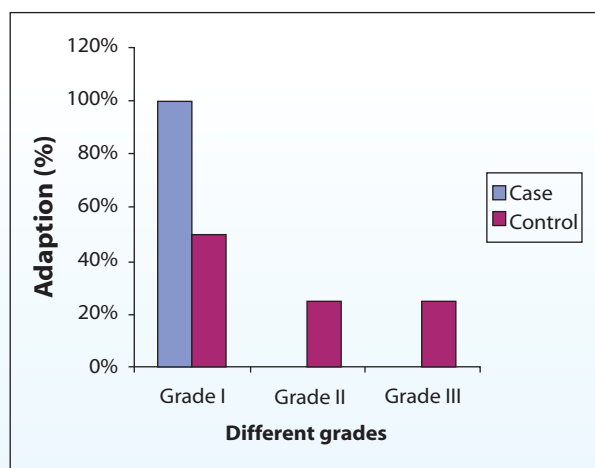


Fig 1: Comparison of adaptation between groups

Discussion:

Patients with badly broken tooth are conventionally managed with cast or pre-fabricated metallic post & core system. But the introduction of composite post & core system in the late 80s to early 90s has changed the concept & the success of the treatment. Margareta et al have described in their retrospective study on 236 patients done in the University of Karolinska that, the fiber reinforced composite post offers a resilient, highly retentive method with uninterrupted bonding between the tooth through the post & core, & has superior retention & esthetic than metallic post⁵. We tried with alternative & newer concept of fiber reinforced composite post & core system to restore the grossly carious teeth with extensively broken crown with good result. After 12 month's assessment, the teeth treated with composite post system showed higher success in terms of adaptation. Total percentage of case group patients had no signs of radiographic gap in between post & the dentine, therefore no adaptation problem, but half of the percentage of control group patients had radiological adaptation failure. The periodontal conditions such as plaque accumulation, gingival health, bleeding on probing & pocket depth around the teeth with composite post & core system were similar to the teeth used as control. No patients, treated with composite post & core system had any findings of corrosion & discoloration at the gingival margin & were proved to be esthetically highly satisfactory. The composipost system is a new concept for post & core restoration on endodontically treated tooth. For optimal results the manufacturer's instruction must be followed carefully. When the system is used, resin based cement is necessary⁶. Resin cements establish a stronger bond to the dentin walls of the root canal after the removal of die smear layer & application of dentin bonding agents & to the post itself thereby increasing the retention of the dowel⁷⁻⁸.

Conclusion:

Fiber reinforced composite post & core system is a very recent addition to endodontic & conservative dentistry worldwide. It is yet to be introduced in Bangladesh. From the above made conclusive follow up, it can be a popular, efficient & promising alternative to cast metallic post & core system & can bring a newer scope in treatment.

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Red Blood Cell Indices in Rural and Urban Women of Reproductive Life

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Abstract:

Background: The population in Bangladesh is predominantly rural. Many of them live at the remote areas. Their socioeconomic condition is very low. More over women are the poorest at the rural areas. They have few earning opportunities in the community. As a result, their nutritional intake is often inadequate. **Objectives:** To observe MCV, MCH & MCHC status in rural and urban women of reproductive age. **Methods:** This cross-sectional study was conducted in the outpatient department of model family planning clinic of Rangpur Medical College, Rangpur from July 2012 to June 2013. A total number of 100 women were selected, among them 50 were apparently healthy urban women of reproductive age (Group A) and 50 were rural women of reproductive age (group-B). Blood was collected from each subject to measure MCV, MCH, and MCHC. For statistical analysis, independent sample 't' test was performed by using SPSS 15.0 versions for windows. **Results:** Mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration were significantly decreased ($p < 0.001$, $p < 0.001$, $p < 0.05$ respectively) in rural women than that of control group. **Conclusion:** Red blood cell indices were significantly decreased in rural women than urban women of reproductive age.

Key word: Red blood cell indices, Rural women, Urban women.

Rangpur Dent. Coll J 2017; 5(1): 26-29

Introduction:

Bangladesh is one of the most densely populated countries in the world. About 160 million people squeezed into an area of 145,000 square-kilometers. There are nearly 861 people live in per square kilometer¹. In Bangladesh about 80% population living in the rural areas². Many of them live in remote areas those lack of services such as education and health care. Among them women are suffering from discrimination, few earning opportunities and their nutritional status is very low³. Poverty and nutrition are closely related. Poverty leads to hunger, ill health and undernutrition⁴. Inadequate nutrition causes not only havoc to women own health but also that of their children. Maternal malnutrition during pregnancy increases the risk of mortality, as well as it affects fetal growth, resulting in low birth weight, risking the survival of the child⁴. Hookworm infection is one of the most common problems in rural people of Bangladesh. The hookworm provokes damage to the villi, resulting in blood loss and

anti-coagulant production, which promote continued bleeding. Hookworm infestation and under nutrition are leading causes of anaemia of rural people in Bangladesh⁵. In the urban areas about 37% population was living below national poverty line⁶. Though, they maintain a better standard of living status than rural people. They try to maintain better nutritional requirement, sanitation and hygiene habit⁴. Anaemia is a wide spread public health problem associated with an increased risk of morbidity and mortality especially in rural women⁷. Iron deficiency anaemia is one of the most common nutritional disorders and it has public health importance in developing countries like Bangladesh. It is the most common causes of nutritional anemia in adolescents and women of reproductive age, especially in rural area⁸. The women of reproductive age are suffering from nutritional anaemia because of their more iron demand. During this period owing to iron loss from menstruation and less intake of

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iron containing diet⁵. Iron deficiency anaemia is characterized by decreased haemoglobin (Hb) concentration below lower normal limit and iron status. The haemoglobin concentration and iron status of the subjects were estimated by measuring haemoglobin (Hb) concentration, Mean corpuscular volume (MCV), Mean corpuscular haemoglobin (MCH)⁹.

Iron deficiency anaemia hinders normal functions in all age groups and reducing work performance. Maternal iron deficiency causes adverse pregnancy outcomes, Iron deficiency causes also impaired immune responses, gastrointestinal abnormalities, changes in the hair and nails. There are also observed in subjects with iron deficiency impaired thermogenesis, altered thyroid metabolism and changes in catecholamine turnover.

The main aim of this study is to observe haematological status in rural and urban women of reproductive age by measuring MCV, MCH, MCHC.

This study will help to improve haematological status of reproductive women especially in rural area by increasing awareness and taking preventive measures.

Materials and Methods

This Cross-sectional analytical study was carried out between July 2012 to June 2013 in Model Family Planning Clinic of Rangpur Medical College & Hospital, from the rural and urban women of reproductive age were 18-45 years. Study was done on a total number of 100 subjects, who were divided in two following groups, apparently 50 healthy subject were selected from rural area as experimental group. Age matched apparently 50 healthy subjects were selected from the urban community as control group. Sampling method was purposive.

After selection of subjects, the objectives and the procedure of the study were explained in detail to them & their informed written consent were taken. A standard questionnaire was filled after taking history and through clinical examinations. All study procedures were maintained at the Model Family Planning Clinic, Rangpur Medical College & Hospital. At first five (5) ml of blood was collected from antecubital vein from each subject under all aseptic precaution by a disposable syringe. The needle was detached from the nozzle and then blood was immediately transferred into a test tube which containing EDTA (ethylene diamine tetra acetate) an anticoagulant. Then the test tube was rolled gently between two pump for proper mixing of anticoagulant with blood and immediately

taken to the laboratory. Then RBC indices were studied with an automatic electronic blood count analyzer at the department of biochemistry, Rangpur medical college. Rangpur.

Results:

Mean ±SD value of MCV, MCH, MCHC were (86.582± 4.5032, 28.030 ±1.7817, 32.350 ± 1.1518) in urban women and (80.043± 7.9899, 25.657±3.0750, 31.826 ± 1.1605) in rural women.

The data depicted in table -I shows an alteration in the haematological parameter in rural women than those of healthy control subject. In the cross-sectional study MCV and MCH was significantly higher (p<0.001***) and significant difference MCHC in rural women than those healthy urban women.

Table I: Mean ± SD distribution of MCV, MCH and MCHC in two groups.

Variables	Group-A(n=50) Mean ± SD	Group-B(n=50) Mean ± SD	P value
MCV fl	86.582± 4.5032	80.043± 7.9899	<0.001***
MCH pg	28.030 ±1.7817	25.657±3.0750	<0.001***
MCHC%	32.350 ± 1.1518	31.826 ± 1.1605	<0.05*

A = Urban women of reproductive age (Control). B = Rural women of reproductive age (Experimental). n = Number of subjects. SD = Standard deviation. N=number of subjects, *** =p<0.001***, * =p<0.05*

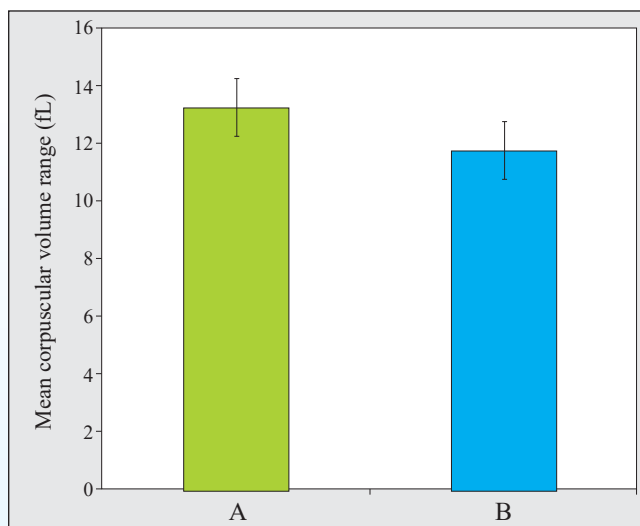


Figure-I: Bar diagram showing mean corpuscular volume in group A(control) and group B(experimental)

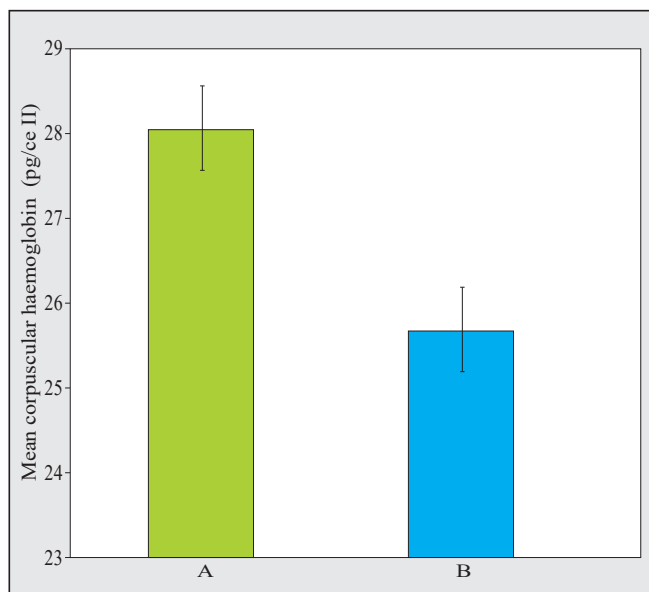


Figure-II: Bar diagram showing mean corpuscular haemoglobin in group A (control) and group B (experimental)

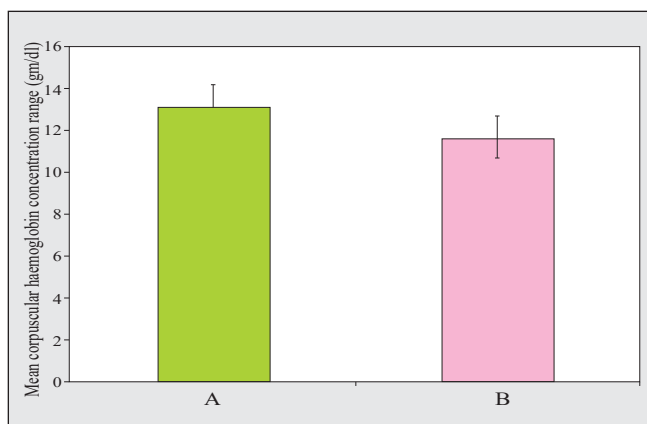


Figure-III: Bar diagram showing mean corpuscular haemoglobin concentration in group A (control) and group B (experimental)

Discussion:

Poverty and undernutrition are closely related to rural people. Poor living standards, limited knowledge on hygiene habits and blood loss due to Hookworm infection is one of the most common problems in rural people of Bangladesh. Hookworm infestation and under nutrition are causes of anaemia in rural people. At the same time in urban areas they maintain a better standard of living status than the rural people. Rural people do not maintain the standard of sanitation and hygiene habits. As far as our knowledge, in our country very limited published data are available regarding these types of findings for comparison.

In this cross-sectional study, MCV, MCH and MCHC are significantly decreased in rural women of reproductive age than those of healthy control subjects. This finding is in agreement with those reported by Sengupta B & Chakrabarti S⁷, Chakraboti S⁹, Modjadj SEP, Albert M & Mamabolo RL¹⁰, Al-Sayes F et al¹¹ & Gholamreza V¹².

It has been suggested that lower levels of MCV, MCH and MCHC may be due to deficiency of protein, iron, vit B₆, vit C, Vit B₁₂ & Folic acid. In adult erythropoiesis occur in red bone marrow & during erythropoiesis protein supply essential amino acid for the synthesis of globin portion of haemoglobin. Iron is essential for the synthesis of haem portion of haemoglobin, the iron containing enzymes essential for electron transfer and oxidation reduction reaction. Vit C reduces ferric iron to ferrous form in the stomach and thus helps iron absorption. It also helps folate metabolism. Folate and vitamin B₁₂ are essential for final maturation of red blood cells. Deficiency of these factors causes decrease MCV, MCH and MCHC count. For these deficiency causes increases the risk of mortality during pregnancy resulting in low birth weight and risking the survival of the child. The study will be helpful to improve their awareness and taking preventive measure of all these factors.

Conclusion

In the present study, it was difficult to comment the exact causes involved for these changes in rural women of reproductive age. It may be included that mean corpuscular volume, mean corpuscular haemoglobin, and mean corpuscular haemoglobin concentration is most likely related to some nutritional deficiency (Such as protein, iron, vitB₆, vit c, folic acid etc), poverty, lack of knowledge about hygiene habits. All of these factors causes decreased total MCV, MCH & MCHC in rural women of reproductive age. These factors essential for increased haematological status. In order to improve women's haematological status, policy should focus on creating opportunities to increase agricultural productivity, promote health service and emphasize women health education in the rural women of reproductive age.

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Reconstruction of Temporomandibular Joint with Costochondral Graft in Children: A Prospective Study

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Abstract:

Purpose: The aim of this study was to evaluate the postoperative functional recovery and growth of the mandible after reconstruction of the condylar process using costochondral grafts in children who have been suffering from bony temporomandibular joint (TMJ) ankylosis. **Patients and Methods:** Temporomandibular joint ankylosis was surgically treated and joint was reconstructed with costochondral grafts (CCG) in four boys and six girls with the mean age of 10 years. Three children had bilateral and rest of them had unilateral ankylosis of TMJ. Postoperative functional recovery of the jaw and craniofacial growth was monitored clinically and radiographically up to two years. **Results:** Postoperative maximum mouth opening (MMO), lateral excursion (LE) of the jaw increased significantly, but protrusion (PRO) not increased after surgical intervention. However, functional recovery in the most of the children (70%) was excellent. In most of the patients (69.2%) CCG was taken well and good remodeling was found radiographically. Nonetheless, resorption was found in some of the grafts (30.8%). In two patients mandible was grew about 5 mm in length and in case of other patients facial growth can not be determined due short study period. **Conclusion:** Reconstruction of the temporomandibular joint using costochondral grafts to in children provide excellent functional recovery of mandible with growth potential. However, a long term follow up is required to evaluate the maximum growth of the jaw.

Key words: Temporomandibular joint, Ankylosis, Costochondral grafts, Arthroplasty, Maximum interincisal opening.

Rangpur Dent. Coll J 2017; 5(1): 30-36

Introduction:

The temporomandibular joint (TMJ) is a synovial joint that allows mastication and speech, formed between the mandibular condyle below and the articular fossa of temporal bone above. These joints are affected by various diseases among them TMJ ankylosis is a very distressing and relatively common in children. The term temporomandibular joint (TMJ) ankylosis is a clinical condition which can be defined as "Inability to open mouth due to either a fibrous or bony union between the head of the mandibular condyle and the glenoid fossa of temporal bone". Trauma and infection in and around the temporomandibular joint are the leading causes of TMJ

ankylosis¹. However, degenerative joint diseases like rheumatoid arthritis, ankylosing spondylitis, may causes ankylosis. Although TMJ ankylosis is one of the most common Pathologies afflicting the facial skeleton, it is the most overlooked and under managed problem in children². Impairment of speech, difficulty in mastication, poor oral hygiene, rampant caries, disturbances of facial and mandibular growth, mandibular micrognathia and bird face deformity, Malocclusion and acute compromise of the airway, etc. present a unique challenge to maxillofacial surgeon in term of patient's physical and psychological management³.

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There is a great deal of controversy about the management of patients with this disorder⁴. Surgical options include gap arthroplasty which is still preferred by some and interpositional arthroplasty which is the standard procedure. Various autogenous graft including the metatarsal⁵, clavicle⁶, and iliac crest⁷ as well as various alloplastic materials⁸ have been used to reconstruct the TMJ. However, the free costochondral grafts has gained popularity in the past two decades.

The costochondral graft offers several advantages, including biologic and anatomic similarity to the mandibular condyle, low morbidity of the donor site, ease in obtaining and adapting the graft and regenerative potential in growing child,^{9,10} Costochondral graft, is used with the hope that because of similarities of its primary and secondary cartilage to those of the mandibular condyle,¹¹ the graft will provide growth potential and keep pace with the growth of the unaffected side, to maintain mandibular symmetry throughout the growth period. Potential problem with the costochondral graft include fracture of the graft, further ankylosis, donor site morbidity, and variable growth behavior of the graft.

In this study costochondral graft has been harvested from patient's contra lateral chest (usually from right side of chest) by a sub mammary incision. Usually 5th, 6th or 7th rib has been harvested along with considerable amount of costal cartilage with a precaution that pleural tear or perforation should not be occurred. Usually 2 to 3 cm rib with 5 mm costal cartilage has been harvested. After harvesting of CCG, graft shaped in desired size and fixed with ramus of mandible with a miniplate and screw or with only stainless/titanium screw so that rigid fixation can be achieved. Patients asked for vigorous postoperative physiotherapy to prevent re-ankylosis and to re-establish normal jaw function.

Materials and Methods

This clinical prospective study was undertaken between January '2007 to December' 2008 at the Oral and Maxillofacial Department of Bangabandhu Sheikh Mujib Medical University Shahbag, Dhaka, Bangladesh. Ten patients were selected those of 5 to 14 years of age group and both male and female child who were clinically and radio logically diagnosed as a case of unilateral or bilateral bony temporomandibular joint ankylosis. Preoperative assessments was done clinically and radiographically to

find out the extent of bony fusion as well as maximum mouth opening, lateral excursion, and protrusive movement of mandible was recorded by a vernier calipers.

All patients were underwent surgery under general anesthesia with elective tracheostomy. Condylectomy and coronoidectomy was done and TMJ was reconstructed with costochondral graft which was fixed to ramus by a miniplate and screw or with only stainless/titanium screw so that rigid fixation can be achieved. Mouth opening exercises were started from 2nd postoperative day. Patients were discharged after 7 to 10 days on average. Follow up recommendations included mouth opening exercise for 6 months. Post operative assessment for jaw movements and complications were performed as in preoperative stage. Follow up assessment was performed at one month, three months, six months, and one year or above.



Figure 1: Preoperative view

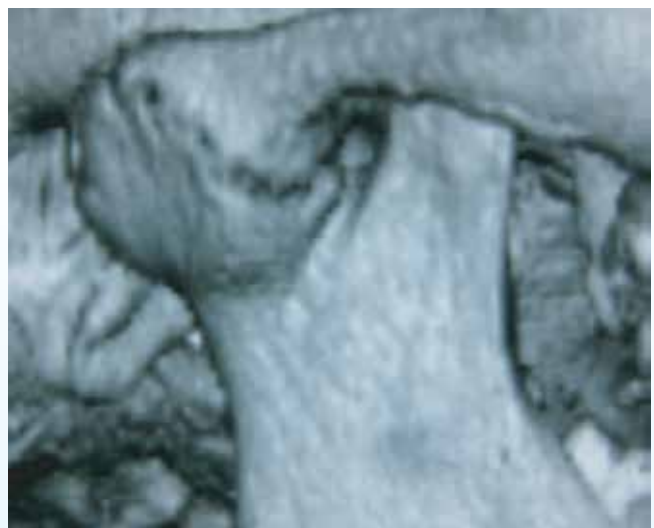


Figure 2: Preoperative CT scan



Figure 3: Preauricular incision



Figure 6: Harvesting CCG



Figure 4: Per Operative mouth opening



Figure 7: Harvested CCG

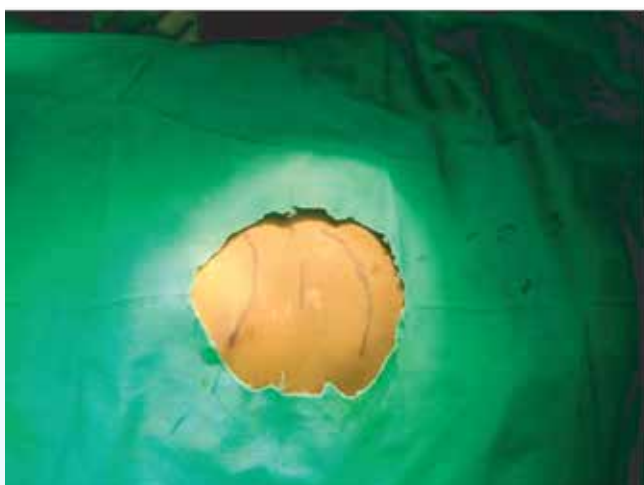


Figure 5: Incision mark for CCG



Figure 8: CCG fix with Ramus

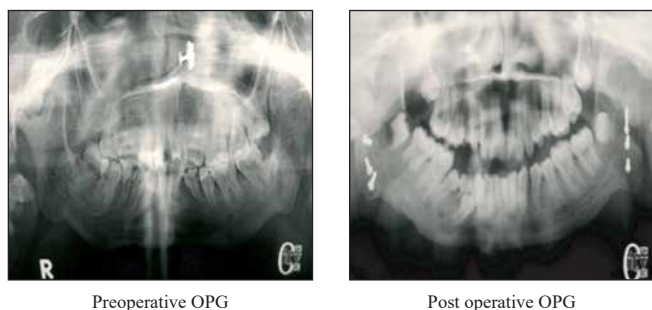


Figure 9: Preoperative and postoperative OPG

Table I: Preoperative clinical data from the patients at the time of presentation

N0.	Age	Sex	Etiology	Duration	Side	MIO	LE	PRO	Deviation	Micrognathia
1.	13 y	F	trauma	6 yrs.	Right	3 mm	3 mm	0 mm	present	absent
2.	10 y	F	trauma	4 yrs.	Both	0 mm	0 mm	0 mm	absent	present
3.	12 y	F	fall	3 yrs.	Both	2 mm	0 mm	0 mm	absent	present
4.	7 y	M	trauma	6 yrs.	Left	4 mm	2 mm	0 mm	present	present
5.	8 y	F	infection	4 yrs.	Right	3 mm	2 mm	0 mm	present	present
6.	9 y	M	trauma	5 yrs.	Left	4 mm	3 mm	1 mm	present	absent
7.	10 y	M	trauma	4 yrs.	Right	8 mm	4 mm	2 mm	present	absent
8.	7 y	F	trauma	5 yrs.	Both	3 mm	0 mm	0 mm	absent	present
9.	10 y	F	trauma	3 yrs.	Right	12 mm	3 mm	2 mm	present	absent
10.	14 y	M	fall	7 yrs.	Both	0 mm	0 mm	0 mm	absent	present

Results:

A total of 10 were included in this study. There was slight female preponderance; the male-female ratio was 4:6 with most patients being in the below 10 years age group. Overall the most common causes of ankylosis was trauma an infection in an around the joint. Total 13 joint were reconstructed, most of them were unilateral TMJ ankylosis.

In this study mean preoperative maximum interincisal opening (MIO) was 1.4 mm and mean post-operative MIO was 35.30 mm after 6 to 15 months follow up. Lateral excursions were absent or limited in almost all affected joints in affected children. Mean preoperative lateral excursion on left side was 1.0 mm and on right 0.6 mm depending on the side of unilateral ankylosis. Post operative lateral excursion was observed as 3.5 mm on left side and 3.5 mm on right side of the jaw. The post operative improvement was statistically significant from preoperative condition.

Protrusive jaw movement was absent in all patients with bilateral ankylosis but unilateral cases some degree of protrusion was present and mean protrusion was 0.5 mm. Post operatively very little improvement was observed as 0.75 mm which is not significant improvement than preoperative condition.

In our study 10 joints were reconstructed with 13 costochondral grafts. We found take and good remodeling in 9 (69.20%), and resorption of graft in 4 (30.80%). It is encouraging for us with a hope that maximum grafts have a potential for growth in future.

Finally this clinical prospective study of post operative outcome among the patients treated with costochondral graft as interpositional material in TMJ arthroplasty showed significant improvement than preoperative conditions in term of functional recovery of the jaw. Although difference from other studies is little it is better in terms of reankylosis and post operative functional recovery.

Table II: Preoperative and postoperative functional recovery of mandible

	Preoperative mean	1 - 1.5 months postoperatively mean	3-4 months postoperatively mean	6- 15 months postoperatively mean
Maximum inter incisabpening (mm)	1.4	39.5	37.6	35.3
Lateral excursion right(mm)	0.6	0.8	2.25	3.5
Lateral excursion (mm)	1.0	0.9	2.5	3.5
Protrusion (mm)	0.5	0.3	0.75	0.75

Table III: Gonion-Menton length of the study patients

	Pre op		Post op		P value
	Mean	±SD	Mean	±SD	
Gonio-Menton length	7.60	±0.74	8.00	±0.82	0.087 NS

Table III: Radiological (OPG) finding of grafts after 1 years (n=13)

	Number	Percentage
Graft take and good remodeling	9	69.2
Graft resorption		
Partial resorption	3	23.1
Complete resorption	1	7.7
Graft fracture	0	0.0
Graft overgrowth	0	0.0

Discussion:

Ankylosis of the temporomandibular joint is an extremely distressing affliction and is a relatively common problem in Bangladesh, like most of the other third world countries¹². In children, not only can trauma to the TMJ result in ankylosis, but it may also impair mandibular growth. TMJ ankylosis denies the victim from the benefit of normal diet, results in malnutrition, prevents normal speech development, and causes severe facial disfigurement that aggravates psychological stress¹³. Release of ankylosis and restoration of normal function is a challenging task for the surgeon as recurrence is very common after surgery and several described techniques and approaches showed no uniformly accepted result¹⁴⁻¹⁶. Use of interpositional material is necessary to prevent reankylosis, to maintain vertical height of the mandibular ramus, and to establish maximal mandibular opening¹⁷. Many techniques for TMJ replacements have been described in an attempt to overcome those complications¹⁸. A variety of autogenous grafts including fibula, metatarsal, clavicle, and iliac crest have been used for reconstruct the TMJ after the resection of an ankylotic mass but no consensus has been reached as to the most suitable material¹². However the free costochondral graft has gain popularity for its some unique properties. Costochondral graft is biologically inert and has anatomic similarity to the mandibular condyle⁷. In addition to better biologic adaptive capacities; the costochondral graft also has the characteristic of primary and secondary cartilage to those of the mandibular condyle.

Ellen wen-ching Ko et al¹⁹ conducted a study in 10 children with a mean age of 7.4 years. They reconstructed surgically treated ankylosed TMJ with costochondral graft and followed up for 4 years. They concluded that CCG provides postoperative functional condyle with growth potential. In our study follow up period is very short in term of observes growth of costochondral grafts. We demonstrate growth of CCG in two patients who have followed up for more than two years. In our study 10 joints were reconstructed with 13 costochondral grafts. We found take and good remodeling in 9 (69.20%), and resorption of graft in 4 (30.80%). It is encouraging for us with a hope that maximum grafts have a potential for growth in future. Medra²⁰ showed take and good remodeling in 50 grafts and resorption in 21 grafts of the total 85 grafts.

In this study mean preoperative maximum interincisal opening (MIO) was 1.4 mm and mean post-operative MIO was 35.30 mm after 6 to 15 months follow up. In Bangladesh, Molla¹² treated 14 cases in three different

groups using three types operative procedure and follow-up them for 12-32 months. He found MIO as 31.33 mm ranges from 18-35 mm. Waresudin²¹ showed post operative MIO as 33.7 mm in a study with folded temporalis muscle flap interposition. Mohiuddin²² conducted a study with S.S. endoprosthesis implant in adult patients and demonstrated postoperative MMO is 35.50 mm. Pogrel and Kaban²³ reported in their retrospective study of 16 ankylosis patients treated with temporalis fascia and muscle interpositional arthroplasty and demonstrated mean preoperative MMO 18.3 mm (2-30mm) and one year post operatively as 38 mm (33 to 43 mm). However the improvement of mouth opening found in our study with costochondral graft is statistically significant. But there is no significant difference with other studies with temporalis muscle and fascia flap.

Lateral excursions were absent or limited in almost all affected joints in affected children. Mean preoperative lateral excursion on left side was 1.0 mm and on right 0.6 mm depending on the side of unilateral ankylosis. Post operative lateral excursion was observed as 3.5 mm on left side and 3.5 mm on right side of the jaw. The post operative improvement was statistically significant from preoperative condition. The reason behind is that better translational movement in the operated joint due to presence of costochondral graft and a temporalis muscle between glenoid fossa and the condyle. Temporalis muscle helps to glide the joint under it. Hasan²⁴ in his study shows 2.6 mm lateral excursion after fifteen months follow up with composite Temporalis Muscle flap and Waresuddin²¹ in his study shows 2.6 mm and 1.9 mm after fifteen months follow-up with folded temporalis muscle flap. Rahman²⁵ et al presented a case report of bilateral TMJ ankylosis treated with costochondral grafts and mouth opening was 32mm and left & right lateral excursion was 04mm & 06mm one month after surgery.

Protrusive jaw movement was absent in all patients with bilateral ankylosis but unilateral cases some degree of protrusion was present and mean protrusion was 0.5 mm. Post operatively very little improvement was observed as 0.75 mm which is not significant improvement than preoperative condition. Reason behind is the absence of lateral pterygoid muscle on the affected side.

Some patients have developed post operative open bite. In first visit it was 2 (20%), in second visit it came down and all patients were recovered. Intermaxillary traction was done for 1 to 2 weeks in indicated cases to overcome this problem.

Probable reason of anterior open bite in so many cases was coronoidectomy and release of temporalis pull and stripping of masseter muscle for fixing the graft. This causes transient trismus and anterior open bite. One of the major complications in ankylosis surgery is recurrence. In this study no patient reported with reankylosis rather they are all in good functional condition. Reason behind this success is creating 1.5 cm gap arthroplasty and using temporalis fascia and costochondral graft. Strict compliance of post operative physiotherapy and regular follow up were maintained by all patients. Finally this clinical prospective study of post operative outcome among the patients treated with costochondral graft as interpositional material in TMJ arthroplasty showed significant improvement than preoperative conditions in term of functional recovery of the jaw. Although difference from other studies is little it is better in terms of reankylosis and post operative functional recovery.

Conclusion:

Temporomandibular joint ankylosis is extremely disabling condition especially in children. It is a relatively common problem in Bangladesh. Many authors tried in different methods to treat this clinical condition. Interpositional arthroplasty seems to be the ultimate solution. Use of costochondral graft as an interpositional material was started from the early twentieth century. Now a days many surgeons effectively used costochondral grafts to reconstruct the TMJ in children. In our study it has been proved that CCG can efficiently restore TMJ functions and prevent reankylosis. Costochondral graft has some disadvantage like donor site morbidity and unpredictable growth. In Bangladesh this is the first study using costochondral grafts in case of TMJ bony ankylosis in children. Within this short period of fifteen months it is not possible to decide about final outcome of the treatment particularly in term of growth of the graft. Much more intense research and long term follow is needed to get a conclusive result about future prospect of the costochondral grafts.

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Prevalence of Gestational Diabetes Mellitus (GDM) In The World - A Systematic Literature Review

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Abstract:

Background: Gestational diabetes mellitus (GDM) is experienced by women during their pregnancy time especially during second or third trimester due to varying degrees of carbohydrate or glucose intolerance. Almost 14% of pregnant women may develop this condition during their pregnancy. However, in more than 90% cases, this glucose intolerance resolves spontaneously just after delivery to maintain normal glucose level. But some women with GDM are not able to return in normal glucose regulation (NGR) and eventually develop an early episode of diabetes mellitus immediately after delivery. **Objective:** To find out the prevalence of gestational diabetes mellitus and associated risk factors. **Methodology:** This was a systematic literature review. Fifty four original papers were selected after fulfill inclusion and exclusion criteria from different search strategies. **Result:** The prevalence rate of gestational diabetes mellitus was from 1.19% to 17.70% and main risk factors associated with the prevalence of GDM were increasing maternal age, increase maternal body weight, ethnicity, and family history of diabetes and poly cystic ovary syndrome. **Conclusion:** The highest prevalence of GDM in Asia was 17.70% which was the highest prevalence of this review as well. The highest prevalence of GDM in America, Europe, Africa and Australia were 15.3%, 8.74%, 8.8% and 7.4% respectively.

Key words: GDM (Gestational diabetes mellitus), Poly cystic ovary syndrome, Increased maternal age.

Rangpur Dent. Coll J 2017; 5(1): 37-40

Introduction:

Diabetes mellitus define as a metabolic disorder of multiple causes and manifested by chronic hyperglycemia resulting disturbances of carbohydrate, fat and protein metabolism due to defects in insulin secretion, insulin action or combination of both¹. Blood glucose levels are maintained by a series of complex interaction of multiple chemicals and hormones in the body, especially the hormone insulin, produced by beta cells of the pancreas² Therefore, diabetes develops due to a diminished production of insulin known as type 1 diabetes mellitus or resistance to insulin action known as type 2 diabetes mellitus and gestational diabetes mellitus¹. Gestational diabetes mellitus (GDM) is experienced by women during their pregnancy time especially during second or third trimester due to varying degrees of carbohydrate or glucose intolerance³. According to Jovanovic et al⁴ almost 14% of pregnant women may develop this condition during their pregnancy. However, in

more than 90% cases, this glucose intolerance resolves spontaneously just after delivery to maintain normal glucose level⁵. But some women with GDM are not able to return in normal glucose regulation (NGR) and eventually develop an early episode of diabetes mellitus immediately after delivery⁶. Women with the history of GDM are at increased risk for the future episode of GDM, pre-diabetes (impaired glucose tolerance and impaired fasting glucose) and type 2 diabetes⁷. Women who had the history of GDM often ignore about developing diabetes mellitus in their future life,⁸ more than 135000 women are affected by GDM every year nonetheless⁷. According to Ben-Haroush et al,⁹ women with the history of GDM, having 17% to 60% risk of developing of type 2 diabetes mellitus within 5 to 16 years after delivery. Järvelä and his colleagues found from their research that women with the age 30 years, received insulin treatment during pregnancy, positive to ICAs and

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GADAs are more likely to develop type1 diabetes in their future life if they suffered from GDM¹⁰.

The study was done to find out the prevalence of gestational diabetes mellitus and associated risk factors.

Methodology:

Research Design

"A systematic review attempts to collect all empirical evidence that fits pre-specified eligibility criteria in order to answer a specific research question" Higgins and Green¹¹. This systematic literature review was conducted to review the prevalence of gestational diabetes mellitus globally since 1991 and find out the risk factors associated with its prevalence. Systematic literature reviews reduce massive amount of information into understandable level. For an example, over 20000 journals publish annually which contain more than 2 million articles in the field of biomedical literatures¹². Therefore systematic literature review is the most resourceful scientific technique which is quicker and minimized time¹³.

Sources of information

Papers for this systematic literature review were collected by searching electronic data sources Pubmed, Academic search complete, Cinahl plus, national and international organizations to find out primary research articles and supporting information with the aim of producing an informative literature review. Published papers on prevalence of gestational diabetes mellitus were gathered from the data sources after fulfill the inclusion and exclusion criteria those criteria were implemented for this systematic literature review. Fifty papers were included in this review and gave them serial number (Study 1 to Study 54).

Search strategies

To find out appropriate studies for this review following search strategies were used on Pubmed, Academic search complete and Cinahl plus. First electronic search was done on Pubmed, using headings "diabetes mellitus", "gestational diabetes mellitus", and "prevalence of gestational diabetes mellitus". The search was limited to studies that were published after 1991, female, studies written in English and all adults above 19 years of age. Second electronic search was done on Academic search complete, using similar headings but the search was limited to studies that were published after 1991 and studies written in English. Third electronic search was done on Cinahl plus, again similar

headings were used but the search was limited to studies that were published after 1991, female and studies written in English.

Heterogeneity analysis

Heterogeneity analysis will provide more insight of the study and focus on differences across the main body of papers and outcomes. Heterogeneity is also associated with methodological diversity that may indicate different degrees of bias of the studies. In this review heterogeneity analysis was applied to assess the strength and consistency of evidence regarding age as a risk factor for GDM. Eight papers among fifty four papers were taken to performed heterogeneity analysis because those papers provided age specific prevalence rate. Two subgroups were created, age of one group was ≥ 35 years and age of second group was <35 years. The analysis was performed with RevMan software and a forest plot was produced to exemplify results for dichotomous outcome.

A forest plot - graphical presentation designed to illustrate to observe effects in studies included in the systematic review displays the findings from heterogeneity analysis. The result from forest plot was described by interpreting Chi-squared statistic, degree of freedom, Inconsistency, confidence interval and P value.

Sensitivity analysis

To see the capacity of common result, sensitivity analysis was done. Sensitivity analysis tells about the studies whether they are sufficient to produce the outcome of the review or not. Sensitivity analysis also explains the publication bias. The funnel plot was used in this review to show the graphical presentation of the studies to measure the sensitivity analysis.

A funnel plot - is a useful graphical presentation to check the existence of publication bias in meta-analyses. Five studies out of six studies those were excluded from this review were used to see the publication bias. Data were extracted from those papers and put in the RevMan. Outcomes compared with those were included for this review in the funnel plot to see publication bias.

Results:

Studies were selected from different countries of Asia (n=19), America (n=19), Australia (n=5), Europe (n=9) and Africa (n=2). In Asia, 10 studies out of 19 studies were taken from different countries of south Asia. In American, most of the studies were taken from USA and Canada.

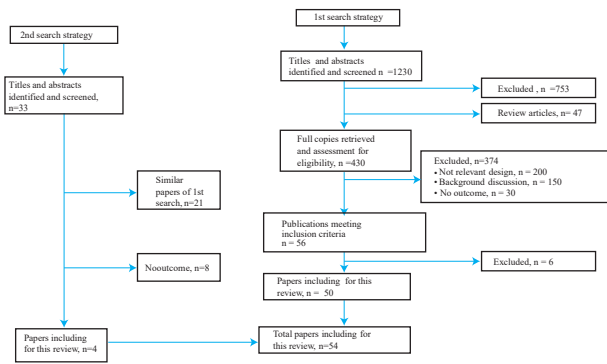


Figure 1: Flow chart of study selection process

Heterogeneity analysis

Forest plot

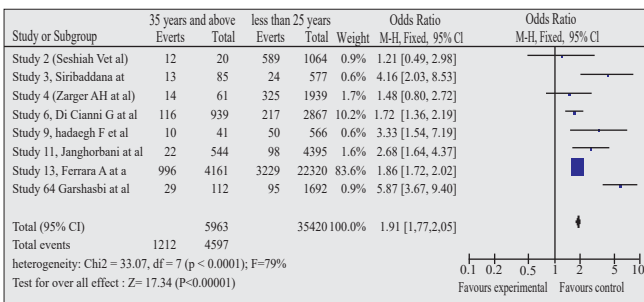


Figure 2: Heterogeneity analysis for age of pregnant women

The value of chi-squared statistic was greater than the value of degree of freedom (df), indicating presence of heterogeneity. The value of I² was 79% which indicated that there was considerable heterogeneity present. Therefore, pregnant women ≥ 35 years of age were in more risk than pregnant women <35 years of age, was doubtful. The CI related to eight studies did not overlap the midline except two studies (study 2 and study 4). It is noticed that study 2 and study 4 included the value of 1 in their CI. So there is a chance that the prevalence of GDM may be equal in the two age groups included in the heterogeneity analysis.

Sensitivity analysis

Two studies with relatively higher sample size (SE- 0.1 and higher than 0) both felt on the left side of the median line. The studies with lower sample size felt asymmetrically. Two of those studies felt on the left side but within the triangular box and four of them felt on the right side. Two out of those four studies felt within the triangular box and other two studies felt outside the triangular box. This finding suggested the possibility of publication bias.

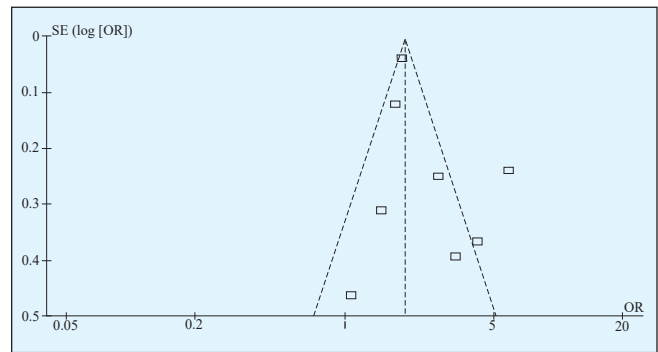


Figure 3: Funnel plot before adding excluded studies

Discussion:

The prevalence rate of gestational diabetes mellitus was from 1.19% to 17.70% and main risk factors associated with the prevalence of GDM were increasing maternal age, increase maternal body weight, ethnicity, and family history of diabetes and poly cystic ovary syndrome. The highest prevalence of GDM in Asia was 17.70% which was the highest prevalence of this review as well. The lowest prevalence of GDM in Asia was 1.19% and this was also the lowest prevalence of this review. The highest prevalence of GDM in America was 15.3% and the lowest prevalence of GDM in America 2%. The highest prevalence of GDM in Europe was 8.74% and the lowest prevalence of GDM in Europe was 1.8%. The highest prevalence of GDM in Africa was 8.8% and the lowest prevalence of GDM in Africa was 3.7%. The highest prevalence of GDM in Australia was 7.4% and the lowest prevalence of GDM in Australia was 4.29.

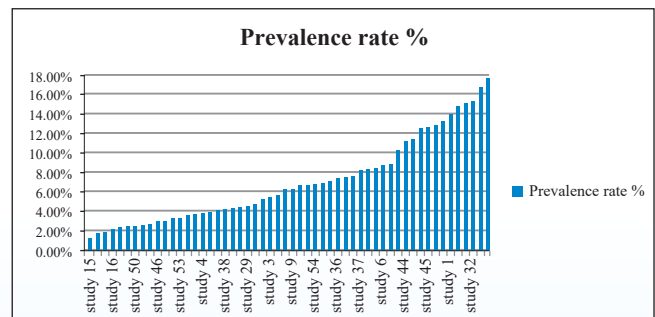


Figure 4: prevalence rate (%) of GDM from lowest to highest

This review found risk factors associated with the prevalence of GDM were increase maternal age, increase body weight, ethnicity, family history of diabetes mellitus, previous history of GDM, history of PCOS, history of still birth, history of macrosomia, urbanization, short statue and smoking. Among these risk factors increase maternal age was most significant risk factor for the development of GDM. Most of the studies reported increasing maternal age as a risk factor for developing GDM except three studies.

Recommendation

Educational programmes should be implemented for all populations to describe impact and effect of the disease especially for highly vulnerable population for an example south Asian, African-American to promote health awareness. Therefore, particular group who are naturally more susceptible for GDM due to increase age, increase body weight, ethnicity and family history should be targeted to improve their lifestyle and to improve their diet. Screening programme should be considered for all pregnant women to diagnosis GDM.

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Retreatment of Furcal Perforation with Portland Cement: A Case Report

Shanta NK¹, Bashar AKM², Sheikh AH³

Abstract:

Furcal perforations are the significant mishaps of endodontic treatment and could lead to endodontic failure. A clinician can overcome this procedural accident with the advent of new technologies, biocompatible materials that utilize the applications of basic research along with tissue engineering concept in clinical practice. In this case report, patient presented with the complain of continuous dull pain in the left mandibular second molar. He mentioned that the tooth was treated 1month before. Radiograph revealed unsatisfactory root canal filling, massive furcal perforation which was tried to fill with GP and thickened PDL space. Analysing the condition, retreatment along with non surgical repair with Portland Cement (PC) was planned and performed successfully.

Key words: Furcal perforation, Missed canal, Perforation repair, Portland cement.

Rangpur Dent. Coll J 2017; 5(1): 41-43

Introduction:

Root canal perforations are defined as the communication between the pulp cavity and the periodontal tissue and alveolar bone¹. They may occur on the pulp-chamber floor during root canal location and prosthetic space preparations for radicular post². Such perforations are managed surgically or non-surgically, depending on the particular characteristics of the case. The prognosis depends on the location, size and time of contamination of the lesion. If diagnosed correctly and treated with a material having suitable sealing ability and biocompatibility prognosis is usually good³.

Several materials, such as zinc oxide and eugenol, glass ionomer cements, and composite resins, have been suggested to repair root canal perforations⁴. MTA is currently the most indicated material for root-end fillings and repair of root canal perforations⁵. Wucherpfennig showed through X-ray diffraction analysis that both MTA and Portland Cement (PC) have "identical characteristics"⁶. Both the materials has experimentally compared through several in vivo and in vitro experiments, animal studies and

recently through human trials to see whether PC can be used as a cheaper alternative of MTA in clinical use. De-Deus et al. experimented possible micro leakage through sealing of furcal perforations using PC, white Angelus MTA, MTA Bio in extracted human molar teeth. They concluded that the sealing ability promoted by the 3 cements was similar⁴.

Case Report:

A 23-year-old male patient in good general health sought treatment at the department of Conservative Dentistry and Endodontics With the complain of continuous dull ache in left mandibular 2nd molar. He mentioned that the tooth was Root canal treated 1month back. Intraoral examination revealed that the tooth was restored. A periapical radiographic examination showed unsatisfactory endodontic treatment, Floor perforation and perforation was filled GP in left lower 2nd molar. Condition was diagnosed furcal perforation of lower left 2nd molar. His medical history was non contributory. Retreatment and perforation repair was plane.

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The granulation tissue was removed and irrigation using 1% sodium hypochlorite was performed. The mesial root canals were identified and preparation was completed, canal irrigation was performed at each instrument change using 1% sodium hypochlorite and 17% EDTA.

Perforation repair followed by Re-RCT



Fig 1: Preoperative, identification of perforation, repair, obturation

After the preparation, the root canal and perforation cavity were filled for 1wk with calcium hydroxide paste. All canals were filled with Sealapex sealer and gutta-percha cones. The perforation cavity was sealed using grey Portland cement mixed with distilled water (Figure 1(b)). Glass ionomer cement was placed over the Portland cement. In the final radiograph, Clinical (Figure 1(e)) and radiographic monitoring was performed at six months and one year. Absence of pain, fistulas, edema, and periodontal pockets, as well as a normal tissue colour and radiographic repair were observed.

Discussion:

Root and furcal perforations represent a leading cause of endodontic therapy failure¹. Proper treatment can be performed by the two different ways: access through the radicular root canal or by surgical access to the external root surface⁸. The location of the root perforation, time between perforation and treatment, presence of contamination, and physicochemical and biological properties of the used sealing material determine the success of the treatment⁹. To achieve success in the treatment of perforations, a correct treatment planning is important. In this case, the cause of the perforation was an iatrogenic procedure related to an error while performing the location of mesial root canals in tooth. In cases of perforations, control of contamination process is essential for successful treatment¹⁰. Before the perforation sealing using PC, a

calcium hydroxide paste can be used to disinfect the perforation area and prevent granulation tissue invagination¹¹. In the present cases, a calcium hydroxide intracanal medication was used to fill the root canals and perforation cavities. When combined with different vehicles, calcium hydroxide provides a strong base that can stimulate the mineralization process and decontaminate the surrounding environment. However, calcium hydroxide is a soluble material in the presence of tissue fluids¹². In the treatment of perforations, calcium hydroxide does not result in the formation of a mineralized tissue barrier¹³.

The use of a biological material is required to seal a perforation cavity. MTA is hygroscopic, promotes expansion, and seals the perforation cavity¹⁴. During the hydration process, the calcium silicates react to form a calcium hydroxide and hydrous silicate gel with a high alkaline pH¹⁵. Furthermore, MTA is a biocompatible substrate that provides cell adhesion and differentiation stimulating the mineralized tissue formation¹⁶. It is considered to be a nonirritating bioactive silicate cement that is capable of stimulating the biosynthesis activity of the periodontal ligament cells and to play a role in cement formation and induction of bone tissue repair^{11,17}. In MTA-hydrated cement, calcium hydroxide sedimentation is lower than in Portland cement¹⁵. By studying the cytomorphology of osteosarcoma cells, it has been proved that Portland cement is a nonirritant material that does not affect the structural integrity of cells¹⁸. The biological evaluation of MTA, Portland cement, or calcium hydroxide showed that the mechanisms of action of the materials are similar¹⁹.

Moreover, it has also been shown that PC contains the basic elemental composition of MTA, except the presence of bismuth oxide²⁰ and considerable levels of calcium oxide which has an important role on tissue biological response from its conversion into calcium hydroxide and, consequently, stimulating tissue mineralization²¹. Recently, Borges used PC as furcal perforation repair. The 11-year followup showed radiographic repair of the tissue adjacent to the perforation and absence of clinical signs and symptoms or periapical lesion. In his the second case, 9-year follow up showed the tooth in masticatory function with radiographic and clinical aspects compatible with normality. However, proper selection of material and lot more clinical trials are required to establish PC as an alternative to MTA to appropriate medical/dental regulatory authorities as a permitted material for clinical use²².

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Rangpur Dent. Coll J 2017; 5(1)

INFORMATION TO AUTHORS

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- Should be informative
- Should be limited to less than 250 words
- Should be suitable for use by abstracting journals and include data on the problem, materials and method, results and conclusion.
- Should emphasize mainly on new and important aspects of the study
- Should contain only approved abbreviations

Introduction: The introduction will acquaint the readers with the problem and it should include:

- Nature and purpose of the study
- Rationale of the study/observation
- Strictly pertinent references
- Brief review of the subject excepting data and conclusion

Materials and Methods: This section of the study should be very clear and describe:

- The selection criteria of the study population including controls (if any).
- The methods and the apparatus used in the research.
- The procedure of the study in such a detail so that other worker can reproduce the results.
- Previously published methods (if applicable) with appropriate citations

Results: The findings of the research should be described here and it should be:

- Presented in logical sequence in the text, tables and illustrations.
- Described without comment.
- Supplemented by concise textual description of the data presented in tables and figures where it is necessary

Tables: During preparation of tables following principles should be followed:

- Tables should be simple, self-explanatory and supplement, not duplicate the text.
- Each table should have a title and typed in double space in separate sheet.
- They should be numbered consecutively with roman numerical in order of text. Page number should be in the upper right corner.

Illustrations: Only those illustrations that clarify and increase the understanding of the text should be used and:

- All illustrations must be numbered and cited in the text.
- Print photograph of each illustration should be submitted.
- Figure number, title of manuscript, name of corresponding author and arrow indicating the top should be typed on a sticky label and affixed on the back of each illustration.
- Original drawings, graphs, charts and lettering should be prepared on an illustration board or high-grade white drawing paper by an experienced medical illustrator.

Figures and photographs: The figures and photographs:

- Should be used only where data can not be expressed in any other form
- Should be unmounted glossy print in sharp focus, 12.7 x 17.3 cms in size.
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Legend: The legend-

- Must be typed in a separate sheet of paper.
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- All drugs should be mentioned in their generic form. The commercial name may however be used within brackets.

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- The authors' comment on the results and to relate them to those of other authors.
- The relevance to experimental research or clinical practice.
- Well founded arguments.

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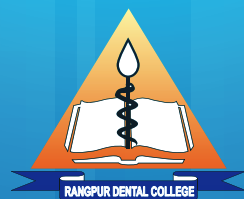
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