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The Ibrahim Cardiac Medical journal is an English Language Scientific dealing with cardiovascular medicine addressing preventive, curative and rehabilitative cardiac services. It is an official journal of Ibrahim Cardiac Hospital & Research Institute and is published bi-annually.

The Ibrahim Cardiac Journal of Bangladesh intends to publish the highest quality material on all aspects of cardiovascular health and disease. It includes articles related to original research findings, technical evaluations and reviews. In addition, it provides readers opinion regarding the articles published in the journal.

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The Ibrahim Cardiac Medical Journal (published bi-annually) accepts contributions from all branches of cardiovascular diseases which include original articles, review articles, case reports and letter to the Editor.

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The standard layout of a manuscript is:

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- Abstract, including Keywords
- Introduction (not headed)
- Methods
- Results
- Discussion
- Acknowledgements
- Funding
- List of references
- Tables & Figures (including legends)
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The pages should be numbered in the bottom right-handcorner, the title page being page one, etc. Start each section on a separate page.

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A separate page which includes the title of the paper. Titles should be as short and concise as possible (containing not more than 50 characters). Titles should provide a reasonable indication of the contents of the paper. This is important as some search engines use the title for searches. Titles in the form of a question, such as 'Is plasma homocystine a cause or manifestation of acute myocardial infarction?' may be acceptable.

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h ttp://ohsr.od .nih.go v/guidelines/helsink i.h tml . Investigators are encouraged to read and follow the Declaration of Helsinki. Clinical studies that do not meet the Declaration of Helsinki criteria will be denied peer review. If any published research is subsequently found to be non-compliant to Declaration of Helsinki, it will be withdrawn or retracted. On the basis of the Declaration of Helsinki, the Ibrahim Cardiac Medical journal requires that all manuscripts reporting clinical research state in the first paragraph of the 'Methods' section that:

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All manuscripts for publication should be addressed to the Executive Editor:

Dr. Md. Nurul Amin
Associate Professor (Part-time)
Ibrahim Cardiac Hospital & Research Institute
122, Kazi Nazrul Islam Avenue, Shahbag, Dhaka-1000
E-mail: mdamin01@yahoo.com, Tel: 88-02-9671141-43
Cell: +880-1753-178452

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Global Burden of Non-communicable Diseases:Preparedness of Bangladesh to Combat the Menace

Md. Nurul Amin[1]

Non-communicable diseases (NCDs) are now the leading causes of morbidity and mortality worldwide.[1] According to the Global Burden of Disease study, NCDs were responsible for the deaths of 38 million people in 2013[2] accounting for 63% of annual global deaths; most of them were preventable.[3] Forty-two percent of NCD deaths occurred among people under 70 years of age and of those deaths, 82% were in the low- and middle-income countries (LMICs). The estimated 2010 global cost of NCDs was $6.3 trillion (US dollars), which is projected to increase to $13 trillion by 2030.[4] Countries accross the world recognize that something must urgently be done to alter the current state and future outlook of NCDs.[5] The burden of NCDs are projected to exceed the combined burden posed by communicable, maternal, perinatal, & nutritional diseases by 2030 and would emerge as the most common cause of death taking more lives than all other causes combined if appropriate measures are not taken without delay.[6]

Non-communicable diseases share common risk factors related to an unhealthy lifestyle like (1) physical inactivity, (2) unhealthy food behaviour (3) cigarette smoking, which primarily may lead to the development of overweight and obesity, hyperglycemia, dyslipidemia, hypertension and diabetes, all of which, in turn, complexly interact with one another to exponentially increase the risk of ischemic heart disease or stroke.[7,8] In 2010, overweight and obesity were estimated to cause 3.4 million deaths worldwide;[9] the global economic impact of obesity is now approximately $2 trillion.[10] Physical inactivity caused more than 5.3 of the 56 million global deaths in 2008[11] and is currently the fourth leading cause of death worldwide.[12] Current projections indicate time spent being physically inactive will continue to increase substantially.[13] Diet quality and dietary patterns (e.g, excess calories and saturated fat) are poor across much of the world and contribute substantially to the NCD burden.[3,14] Smoking also remains as a notable contributor to NCD risk.[3,8]

In order to tackle the burden of NCDs, there is a need for comprehensive, coherent & multi-sectoral policies and strategies at international, national and local levels.[15,16] This has already been recognized by the World Health Organization (WHO) in its 2013–2020 Action Plan for the Global Strategy for the Prevention and Control of NCDs.[17] This action plan has set six objectives for the prevention and control of NCDs. While this has increased awareness regarding the growing burden posed by NCDs and the need for effective policy response, it remains unclear how far it has led to the development and implementation of appropriate policies, particularly in developing countries.[18] The developed countries, in most cases, have already undertaken broad policy and programmatic analysis to address the challenges posed by the NCDs. However, effective application of such policy in the developing countries including Bangladesh seems to be inadequate.[19] It may be noted that while more than 70% of research on the burden of NCDs are conducted in high income countries, low and middle-income countries (LMICs) are home to only 57% of such researchs.[20] Nevertheless, seldom such research translates into concrete policy

actions in LMICs. Moreover, there is an acknowledged lack of theoretical and conceptual framework that could be used to design appropriate

Author's information:

[1]***Dr. Md. Nurul Amin,*** *Assistant Professor, Department of Community Medicine, Rajshahi Medical College, Rajshahi & Executive*
Editor, Ibrahim Cardiac Medical Journal, Ibrahim Cardiac Hospital & Research Institute, Shahbag, Dhaka.

Correspondence : ***Dr. Md. Nurul Amin,*** *Mobile: 01753178452, e-mail: mdamin01@yahoo.com*

healthy public policy in LMICs.[21] Like many other developing countries, in Bangladesh as well, non-communicable diseases (NCDs) are emerging as major cause of morbidity and mortality, accounting for 61% of deaths.[22] The most common NCDs include cardiovascular diseases, diabetes mellitus, cancer, and chronic respiratory diseases. As the prevalence of these diseases increase, they will impose an even greater burden in the near future.[23]

In response to these emerging trends, the Government of Bangladesh has designed and introduced some innovative initiatives. A substantial number of policy documents have been published to address the critical issues related to the prevention and control of NCDs; however, little effort has been made to conduct a comprehensive analysis of the past and current policy instruments with a view to learn from the experience. A critical appraisal recently done by Biswas et al[24] suggest that the NCD-related policies introduced in Bangladesh align with the World Health Organization's (WHO) 2013–2020 Action Plan for the Global Strategy for the Prevention and Control of NCDs, but they hardly translated into proper planning, implementation and monitoring. Consequently, over the years Bangladesh had meager success in effectively addressing the growing burden of NCDs.

Of the 51 documents analyzed, seven (13.7%) were research/survey, nine were on policies (17.7%), while seventeen (33.3%) were on action plans. On the other hand, five (9.8%) and thirteen (25.5%) were related to guidelines and/or strategic plans/documents respectively from government institutes and non-government institutes. The National Strategic Plan for Surveillance and Prevention of Non-Communicable Diseases in Bangladesh 2007–2010, the first strategic plan for prevention of NCDs,[25] highlighted several action plans such as for hospital based surveillance, inpatient NCD surveillance in specialized institutes, and monthly reporting of morbidity and mortality attributable to NCDs, as well as inpatient surveillance in medical college, district, and upazila hospitals, review meetings, publication of newsletters, reports, capacity building of the human resources and strengthening of information technology (IT) for the improvement of recording and reporting.[24]

There was some evidence of building collaborative efforts for NCD prevention and control through partnership nurtured by UN agencies, other international organizations and NGOs. For strengthening health care system in Bangladesh, government undertook some initiatives. As an innovative initiative, government established the NCD corner in selected Upazila Health Complexes (UHCs) for providing NCD services. In Bangladesh not only the government but also some international and national research centers such as the International Center for Diarrhoeal Disease Research, Bangladesh (icddr,b), Bangladesh Rural Advancement Committee (BRAC), Bangabandu Sheike Mujib Medical University (BSMMU), the Global Health Institute of the North South University, and EMINENCE, are also involved in research related to NCDs.[24]

To reduce modifiable risk factors for non-communicable diseases and underlying social determinants through health promotion, there are twenty-three documents. The first is the "Smoking and Tobacco Products Usage (Control) Act" of 2005. In order to further strengthen it, the Act was amended in 2013. This act highlighted few actions such as, ban on tobacco product advertisement, warning signs on the packaging of tobacco products, controlling the cultivation of tobacco, demotivating establishment of new industries related to tobacco products, ban on purchase and sale of tobacco products to the underaged (below the age of 18), ban on smoking in public places and while commuting on a public transport. In March 2016, Bangladesh introduced larger graphic warning signs on all tobacco packages.[24]

In response to the findings of the National NCD Risk Factor Survey 2011, the health care system of Bangladesh took some initiatives to combat chronic non-communicable diseases. The National NCD plan is a notable one of them. Under this Plan a dedicated unit titled Non-Communicable Diseases Centre (NCDC) with dedicated line director has

been established within the Ministry of Health and Family Welfare. With a view to bring NCD services to the doorstep of the people, one of the key initiatives was the introduction of NCD corner in Upazila Health Complexes (UHCs), first piloted in 2012, with the introduction of three NCD corners in three UHCs in the south-western districts of Khulna Division.[26] Since then, the Government of Bangladesh has taken commendable steps to expand the NCD corners to 300 UHCs throughout the country.

To promote and support national capacity for high-quality research, Director General of Health services (DGHS) in Bangladesh has been empowered to invest in NCD related research. There are also several other national public health research institutes such as Institute of Public Health, the Institute of Public Health Nutrition, the National Institute of Preventive Medicine, the National Institute of Population Research and Training (NIPORT), BSMMU, the National Institute of Cardiovascular Diseases (NICVD) etc. But due to lack of skilled researchers, in these institutes have not yet been able to make any commendable contribution to this field. However, to monitor the trends and determinants of non-communicable diseases and evaluate progress in their prevention and control, the DGHS, in 2010, conducted the first National survey on NCDs and their risk factors. The survey revealed prevalence of hypertension to be 17.9% in general (18.5% in men and 17.3% in women), the prevalence of self-reported or documented DM to be 3.9% (men 4.3% and women 3.6%). A systematic review and meta-analysis between 1995 and 2010 showed that the prevalence of diabetes among the adults in Bangladesh has increased significantly during the period, 4% in 1995–2000, 5% in 2001–2005, and 9% in 2006–2010,[27] while the first, nationally representative study in Bangladesh demonstrated the prevalence of prediabetes and diabetes to be 23 and 10% respectively indicating that the disease has attained an epidemic status.[28] Tobacco consumption is quite common in Bangladesh: prevalence is 51.0% for any form, 26.2% for smoking and 31.7% for smokeless tobacco.[29] Studies exclusively related to dyslipidemia are sparse in Bangladesh. In a study involving secretariat employees in Dhaka, abnormal fasting total cholesterol (TC), LDL-C, HDL-C and TG were found to be 17.3%, 48.5%, 75.6% and 48.5%, respectively.[30] A very recently published study[31] involving 51,353 people predominantly urban resident, demonstrated significantly higher mean serum levels of TC, LDL-C, TG, LDL to HDL ratio and TC to HDL ratio among younger adults aged 30–39 years compared to other age groups, regardless of sex. A series of NCD-related surveys have so far been undertaken with financial/ technical support from sevaral international agencies such as the World Health Organization (WHO) & the Japanese International Cooperation Agency (JICA). Moreover, the first nationwide health facility survey in Bangladesh identified and described the health facilities available for NCD services in the country. But the findings gleaned from these studies, which among others also included the nutritional status and unhealthy behavior of children, that all these efforts have not effectively addressed the issue of NCDs.

Thus, it is evident that Government of Bangladesh has taken numerous of initiatives to combat NCDs. However, effective enforcement of these policies and acts remains problematic. Close monitoring and supervision of the system is lacking making it difficult to ensure proper implementation of these policies at the root level. A multi-sectoral approach is also lacking that could maximize the positive output of these policies and acts. With a view to promote health and prevent NCDs through physical exercise, WHO outlined various guidelines for creating opportunities for games and physical activities in educational institutions.[33] Unfortunately, educational institutions in Bangladesh, especially in urban areas, lack of adequate space or playground for physical activity. The National Sports Policy also emphasized establishing and maintaining open space or fields in all educational institutions. Again, the policy seems to be poorly implemented, as 18.2% of secondary school children of a rural area (Puthia, Rajshahi) was found overweight or obese in a recent study (Life-style Practice among Secondary School Children with Particular Emphasis to Physical

Exercise and Diet, 2019 unpublished document). There are also directions to establish sports facilities, swimming pools and gymnasium in educational institutions - from village to the city level. However, little attention is being paid to operationalize these directives. Agricultural policy clearly emphasized the need to diversify the agriculture sector and produce agricultural products with higher quality of nutrition to satisfy the nutritional needs of the general population. However, in this case too there are no clear directions in ensuring the availability of fresh vegetables and fruits for the city dwellers.[24] Recentlya study titled "A scorecard for tracking actions to reduce the burden of non-communicable diseases" reported that among the four domains of governance, risk factor surveillance, research, and health system response, the performance score Bangladeshs was low in three domains, except for the governance domain (moderate performance).[34] It means that although the government initiated many policies or programs, there is a clear lack of rigorous implementation and monitoring of these policies & programs. On the other hand, the country lacks any integrated community public health program focused on monitoring NCDs on a regular basis. Bangladesh also lacks any national surveillance program focused on NCDs. Unfortunately, only a few tertiary hospitals maintain such NCD surveillance systems.[35] Needless to say, had policies and programs adopted by Bangladesh Government to control NCDs been implemented plan-wise, a much better outcome could have resulted despite the resource-poor context of Bangladesh.

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Effect of Off-pump Coronary Artery Bypass Graft Surgery in Patients with Diabetes Mellitus

Md. Sharif Hasan[1], Abdul Hamid [2], Ahsan Habibur Rahman [3], Nurul Amin [4],Tanvir Ahmed [5], Arman E Wadud [6]

ABSTRAC T

Background & objective : Myocardial revascularization in diabetic patients is challenging. Off pump coronary artery bypass (OPCAB) surgery has been widely used for the treatment of coronary artery disease. The goal of this study was to compare outcomes of OPCAB in diabetic patients relative to non diabetic patients.

Methods: The present prospective study was conducted between January 2014 to June 2017. During the period a total of 193 patients (of whom 70 had diabetes and 123 patients were non-diabetics) were included in the study. All of them underwent coronary artery bypass grafting (CABG) without cardiopulmonary bypass surgery. The early clinical outcomes of OPCAB were evaluated during the postoperative hospital stay.

Result: Over three-quarters of the patients in both diabetic and non-diabetic groups were ≥ 50 years old with no significant intergroup difference (p = 0.825). Majority(90%) of the patients in either group was male (p = 0.786). Nearly half (48.5%) of the patients in diabetic and 45% in non-diabetic group were overweight or obese (p = 0.557). The smokers weremuch higher in non-diabetic group than that in the diabetics (p = 0.009). The average number of grafts needed was considerably higher in the diabetic group (p = 0.079). All the postoperative outcome variables like pneumonia, stroke, arrhythmia, renal failure requiring dialysis and postoperative mortality in both the groups were almost identical (p > 0.05).

Conclusion: Off-pump coronary artery bypassis the preferred choice of revascularization for multi-vessel coronary artery disease in diabetic patients. However, continuous, strict glycemic control is essential to have a good postoperative outcome.

Key words: Off-Pump, Coronary artery bypass surgery (CABG), Postoperative outcome etc.

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INTRODUCTIO N:

Diabetes has become a worldwide health problem that affected 415 million people in 2015.[1] A further 318 million people are estimated to have impaired glucose tolerance.[2] Diabetes is associated with an increased risk of coronary artery disease (CAD) as a result of multiple thrombotic and inflammatory pathways that are enhanced by hyperglycemia, dyslipidaemia, obesity, insulin resistance & oxidative stress. Coronary artery disease is not only more prevalent in diabetic patients compared with nondiabetic patients but also tends to be more

Authors' information:

[1] ***Dr. Md. Sharif Hasan***, *Professor and Senior Consultant, Department of Cardiac Surgery, Ibrahim Cardiac Hospital & Research Institute (ICHRI), Shahbag, Dhaka-1000*

[2] ***Prof. Abdul Hamid***, *Senior Consultant, , Department of Cardiac Anaesthesiology, Ibrahim Cardiac Hospital & Research Institute (ICHRI), Shahbag, Dhaka-1000*

[3] ***Dr. Ahsan Habibur Rahman***, *Assistant Professor, Department of Cardiac Anaesthesiology, Ibrahim Cardiac Hospital & Research Institute (ICHRI) , Shahbag, Dhaka-1000*

[4] ***Dr. Nurul Amin***, *Assistant Professor (Community Medicine), Rajshahi Medical College, Rajshahi & Executive Editor, Ibrahim Cardiac Medical Journal, Ibrahim Cardiac Hospital & Research Institute, Shahbag, Dhaka.*

[5] ***Dr. Tanvir Ahmed***, *Junior Consultant and Assistant Professor, Department of Cardiac Surgery, Ibrahim Cardiac Hospital & Research Institute (ICHRI) , Shahbag, Dhaka-1000*

[6] ***Dr. Arman E Wadud***, *Junior Consultant and Assistant Professor, Department of Cardiac Surgery, Ibrahim Cardiac Hospital & Research Institute (ICHRI)*

Correspondence: ***Dr. Md. Sharif Hasan***, *Phone: +8801711344467, E-mail:drsharifhasan@yahoo.com*

extensive, involving multiple coronary vessels and rapidly progressive.[3,8] Compared to non-diabetics, the diabetics are at greater risk of adverse events after coronary revascularization.[9,10]

In type 2 diabetes, endothelial dysfunction is a key step in the development of myocardial ischemia that impairs endothelium-dependent vasodilatation in coronary conductance and coronary resistance arteries.[11] The accelerating role of diabetes in coronary artery disease (CAD) has been recognized and is related to the greater atherosclerotic burden, metabolic derangements, and the proinflammatory and thrombotic state associated with diabetes.[12] Similarly, the unfavorable effect of diabetes on both short and long-term survival after CABG has been reported by several authors.[13,14] In diabetes with multi-vessel disease[15] coronary artery bypass grafting (CABG) was repeatedly proven to be superior to percutanuous interventions in terms of myocardial infarction, cardiac death, and need for repeat revascularization. Nevertheless, CABG with cardiopulmonary bypass support and cardioplegia induced cardiac arrest (On-pump CABG) may lead to severe complication, such as, stroke[16] and renal dysfunction[17] as demonstrated in prospective studies that show 1-3% incidence of ischemic & hemorrhagic insult after CABG.[18,19] This risk is particularly high for patients with diabetes mellitus.

In recent years, the standard technique of on-pump CABG has been challenged by emerging off-pump technique, which avoids the use of cardiopulmonary bypass & cardioplegia. Comparative data regarding the effect of off-pump CABG in diabetic and non-diabetic patients are scarce and remain inconclusive with respect to mortality, stroke and renal dysfunction,[20-23] The aim of this study was to investigate the outcome of off-pump CABG in diabetic patients compared to their non-diabetic counterparts.

METHODS:

This prospective study was conducted at Ibrahim Cardiac Hospital & Research Institute, Dhaka between January 2014 to June 2017 on 193 patients (70 diabetics and 123 non-diabetics) who underwent isolated off-pump CABG surgery. The diagnosis of DM was based on diagnostic criteria from American diabetic association.[24] Accordingly, diabetes was considered if a patient's HbA1c was > 6.5% or fasting (fasting is defined as no caloric intake for at least 8 hours) plasma glucose > 126 mg/dl (7 mmol/L) or 2 hours postprandial plasma glucose > 200 mg/dl (11 mmol/L) (the test was performed using a glucose load containing the equivalent of 75 gm glucose dissolved in water). However, patients with concomitant left ventricular aneurysm, concomitant post infarction, ventricular septal defect, concomitant moderate to severe mitral or aortic regurgitation and concomitant acquired or congenital cardiac or aortic surgery, emergency surgery, preoperative Intra-aortic balloon pump for any cause, infectious disease, and malignancy were excluded. Both groups of patients were operated on without cardiopulmonary bypass and were evaluated for their early clinical outcomes.

In our center, off-pump CABG has been performed routinely for over 5 years by a single surgeon. Data were collected on demographic variables (age and sex) anthropometrics (weight & height), risk factors of ischemic heart diseases (smoking, hypertension, diabetes, hyperlipidaemia), cerebrovascular disease (CVD), chronic obstructive pulmonary diseases (COPD), chronic heart failure, renal dysfunction, recent myocardial infarction, extent of coronary artery disease, peripheral vascular disease, left main disease, history of myocardial infarction, left ventricular ejection fraction, congestive heart failure.The main outcome measures were in-hospital mortality, IABP on and needed basis, neurological deficit (stroke), post-operative renal failure, pneumonia, duration of ventilator support, drainage during 24 hours (ml), perioperative MI and length of ICU stay. In-hospital mortality was defined as death in the hospital of admission regardless of causes. Post-operative neurological

deficit was defined as a new focal neurological deficit and comatose states occurring post-operatively that persisted >24 hours after its onset and were noted before discharge. Postoperative myocardial infarction was defined as a new Q-wave seen post-operatively in two or more continuous leads on an electrocardiogram or significant rise in post-operative cardiac enzymes. Post-operative bleeding was bleeding that required surgical re-exploration in Operation Theater; intraoperative low cardiac output syndrome was termed when there was requirement of Intra-aortic balloon pump. Patients were installed with an IABP when they developed low cardiac output after CABG surgery. Post-operative pneumonia was defined as growth of pathogenic microorganisms in a sputum culture requiring antibiotics or an X-ray diagnosing pneumonia following cardiac surgery. Post-operative respiratory failure was defined as duration of mechanical ventilation for more than 72 hours or reintubation following cardiac surgery. Wound infection (bone related or any drainage of purulent material from the sternotomy wound).

Data were processed and analyzed using SPSS (statistical Package for social sciences), version 25.0. Data presented on categorical scale were expressed as frequency with corresponding percentage and were compared between groups using Chi-square (χ^2) Test, while the data pertaining to continuous variable presented as mean ± standard deviation (SD), or as median and range and were compared using Student's t-Test. The level of significance was set at 5% and $p < 0.05$ was considered significant.

SURGICAL PROCEDURE:

All patients underwent CABG through median full sternotomy. The in situ left internal mammary artery, was always preferred as the first choice for revascularization of the left anterior descending coronary artery territory. Saphenous vein graft was harvested with an open technique. Heparin was given to all patients receiving off-pump CABG to reach ACT (Activated Clotting Time) of more than 300s. The central temperature was maintained above 36°c to avoid hypothermia induced ventricular arrhythmia. The heart was displaced using a posterior pericardial sling and gauge swabs. For good presentation of the target arteries on the lateral and inferior aspect of the heart, patients were placed in right decubitus tendelenburg position. Stabilization of target coronary arteries was accomplished with these stabilizers. A CO_2 blower was used for a bloodless field. An intra-coronary shunt was used in all patients to maintain coronary flow thereby reducing myocardial ischemia and at the same time minimizing bleeding from the coronary arteriotomy. The same exposure, stabilization and immobilization technique to allow exposure of the lateral, posterior and inferior walls of the heart was used during grafting. The LAD was usually grafted first. The grafting was achieved without much displacement of the heart and without much hemodynamic compromise. Distal anastomosis were performed with continuous 7-0 or 8-0 polypropylene (prolene) monofilament suture. Proximal anastomoses were performed with 6-0 continuous prolene suture.

RESULTS:

The age distribution shows that more than three-quarters of the patients in both diabetic and non-diabetic groups were 50 or > 50 years old with no significant intergroup difference ($p = 0.825$). Over 90% of the patients were male in either group ($p = 0.786$). Nearly half (48.5%) of the patients in non-diabetic and 45% in diabetic group were overweight or obese ($p = 0.557$) (Table I). Risk factors distribution between groups demonstrate that prevalence of smoking was significantly higher in non-diabetic group than that in the diabetic ones ($p = 0.009$). No other conventional risk factors demonstrated their significant presence in either group. None of the clinical and biochemical characteristics was significantly different between the study groups ($p > 0.05$) (table III). However, the average number

of grafts needed was considerably higher in the diabetic group than that in the non-diabetic group (p = 0.079). None of the outcome variables presented in table IV was any different between diabetic non-diabetic groups (p > 0.05).

Table I. Comparison of demographic and anthropometric characteristics between groups

Baseline characteristics	Group		p-value
	Diabetic (n = 70)	Non Diabetic (n = 123)	
Age (years)			
30-39	3 (2.4)	2(2.9)	
40-49	25(20.3)	14(20.0)	0.825
50-59	47(38.2)	31(44.3)	
≥ 60	48(39.0)	23(32.9)	
Sex			
Male	111(90.2)	64(91.4)	0.786
Female	12(9.8)	6(8.6)	
BMI (kg/m2)			
Under weight	2(1.6)	0(0.0)	
Normal weight	67(54.5)	36(51.4)	0.557
Over weight	45(36.6)	26(37.1)	
Obese	9(7.3)	8(11.4)	

Figures in the parentheses indicate corresponding %;
*Chi-squared Test (χ^2) was done to analyze the data.

Table II. Comparison of risk factors between diabetic and non-diabetic groups

Risk factors	Group		p-value
	Diabetic (n = 70)	Non Diabetic (n = 123)	
Smoking*	15(12.2)	19(27.1)	0.009
Hypertension*	89(72.4)	52(74.3)	0.772
Hyperlipidemia /DL*	99(80.5)	57(81.4)	0.873
Cerebrovascular disease (CVD) **	0(0.0)	2(2.9)	0.130
Peripheral vascular disease (PVD)**	2(1.6)	0(0.0)	0.405

Figures in the parentheses indicate corresponding %;
* Chi-squared Test (χ^2) was done to analyze the data.
**Fisher's Exact Test was done to analyze the data.

Table III. Comparison of clinical, biochemical and peroperative data between groups

Risk factors	Group		p-value
	Diabetic (n = 70)	Non Diabetic (n = 123)	
Chronic pulmonary disease (COPD) *	8(6.5)	3(4.3)	0.523
S. Creatinine (Pre-operative) *	1.1 ± 0.3	1.0 ± 0.3	0.074
Chronic heart failure*	22(17.9)	8(11.4)	0.234
Recent MI*	45(36.6)	29(41.4)	0.506
Congestive heart failure*	6(4.9)	2(2.9)	0.498
Extent of CAD*			
Single vessel disease	6(4.9)	4(5.7)	0.801
Multi-vesseldisease	117(95.1)	66(94.3)	
LM disease*	26(21.1)	15(21.4)	0.962
LVEF (%)#	53.3 ± 9.3	53.1 ± 8.9	0.859
Number of grafts needed*	3.0 ± 0.8	2.7 ± 0.8	0.079

Figures in the parentheses indicate corresponding %;
*Chi-squared Test (χ^2) was done to analyze the data.
#Data were analyzed using Unpaired t-Test and were presented as mean ± SD.

Table IV. Comparison of early postoperative outcome between the study groups

Early postoperative outcomes	Group		p-value
	Diabetic (n = 70)	Non Diabetic (n = 123)	
Drainage during the first 24 h (ml)#	196.5 ± 69.8	193.2 ±74.1	0.758
Pneumonia**	1(0.8)	2(2.9)	0.298
Respiratory failure**	2(1.6)	2(2.9)	0.460
Stroke**	0(0.0)	1(1.4)	0.363
Arrhythmia**	1(0.8)	1(1.4)	0.595
Renal failure requiring hemodialysis**	0(0.0)	1(1.4)	0.363
Duration of MV (>12 h) **	3(2.4)	1(1.4)	0.540
LVEF before discharge (%)#	56.5 ± 8.0	56.6 ± 8.2	0.962
ICU stay (days)#	3.3 ± 0.7	3.4 ± 1.0	0.735
In-hospital mortality**	0(0.0)	1(1.4)	0.363

Figures in the parentheses indicate corresponding %;
**Fisher's Exact Test was done to analyze the data.
#Data were analyzed using Unpaired t-Test and were presented as mean ± SD.

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DISCUSSION:

The prevalence of diabetes continues to increase worldwide. Although patients with diabetes have a greater chance of coronary disease & poor prognosis than nondiabetic subjects, CABG has consistently shown improved survival over percutanuous coronary intervention (PCI).[25,26] The recent randomized FREEDOM trial has clearly demonstrated that CABGs are superior to PCI in reducing major adverse cardiovascular events and all cause of mortality in diabetic patients with multivessel disease.[27]

Now a days CABG is the first choice for revascularization strategy in diabetic patients. However, clinical outcomes after CABGs in patients with diabetes are still inferior to those of nondiabetic patients[28], although in the present study early outcome was observed to be almost similar between the diabetics and non-daibetics. Conventional CABG with cardiopulmonary bypass is associated in part with cardiopulmonary bypass.[29] In order to prevent serious complications caused by cardiopulmonary bypass, off-pump coronary artery bypass was used to treat DM patients. OPCAB has a lower mortality rate and postoperative outcomes in diabetic patients compared to conventional on-pump CABG.[30] Many studies also suggested that OPCAB is superior for high risk patients with DM.[31] CABG without cardiopulmonary bypass is a technique that generally has a lower incidence of hematological, neurological and renal complication[32] which is why could be especially advantageous in diabetics. CABG surgery without CPB reduces manipulation of the aorta and elimination of the cardiopulmonary bypass circuit reduces the incidence of neurological complication in diabetic patients.[33]

In the present study, the baseline and perioperative data of patients with and without DM admitted at Ibrahim cardiac Hospital and Research Institute were studied. The results of the study showed that the diabetics needed more bypass grafts than their non-diabetic counterparts, that may be due to diffuse nature of coronary lesion in diabetics. Postoperatively the ejection fraction improved equally in both diabetic and nondiabetic patients.

There is no significant difference in terms of postoperative pneumonia, stroke, arrhythmia, renal failure requiring dialysis or postoperative mortality between the study groups, which might be due to strict perioperative glucose control–an important consideration in diabetic patients undergoing CABG surgery.

CONCLUSION:

OPCAB surgery generally has a lower incidence of perioperative complication in diabetic patients. When patients with DM undergo OPCAB surgery with strict perioperative glucose control, the chances of higher postoperative complications compared to the non-diabetics patients are drastically reduced. The current study shows that OPCAB surgery is safe in patients with DM in terms of reduced postoperative complications provided strict perioperative glycemic control is maintained.

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Ibrahim Cardiac Hospital & Research Institute

Clinicopathological Study of Renal Cell Carcinoma - A Study of 100 Cases

Md. Mohiur Rahman Khan[1], Muhammad Ra qul Hassan[2], Fahmin Rahman[3], ATM Mowladad Chowdhury[4]

ABSTRAC T

Background & objective: Renal Cell carcinoma (RCC) accounts for 2 – 3% of all malignant adult neoplasm and is associated with a mortality of 30-40%. It is not well responding to the conventional chemo and radiotherapy and in early stages of the disease,radical nephrectomy is the treatment of choice. A detailed clinoco-pathological study is of paramount importance to understand its management. The aim of this study is to describe the clinical characteristics and histopathological spectrum of RCC.

Methods: This Cross-sectional descriptive study was carried out in the Department of Urology, BIRDEM General Hospital and Dhaka Medical College Hospital over a period 10 months from June 2013 to March 2014. All FNA positive renal cell carcinomas were included in the study. A total of 100 cases of RCC irrespective of age and sex were selected and their anatomical distribution, clinical presentation, stage at presentation and histopathological type were studied.

Result: The peak incidence of renal cell carcinoma was observed to be between 4th and 5th decades of life. The median age was 52.3 years. A male predominance was observed in the series with male-to-female ration being 3:1. Two-thirds (67%) of the patients were diagnosed incidentally, 23% presented with pain and heamaturia and 10% with loin mass. A sizable proportion of the patients was found to have paraneoplastic syndrome [raised ESR (60%), hypertension (50%), anaemia(40%), weight loss (15%), pyrexia (2%)and hypercalcamia (2%)]. Tumours mainly involved the right kidney in its upper pole (55%). In 60% cases the size of the tumour extends between 3-7 cm. Most of the tumours were diagnosed at Robsing stage II (66%). Histopathological diagnosis showed that 70% had clear cell sub-type RCC, 20% papillary sub-type, 5% chromophobe and 5% othersub-types.

Conclusion: Renal cell carcinoma generally occurs in older persons with a male preponderance, It occurs mainly in right kidney preferably in the upper pole. Patients usually present with paraneoplastic syndrome (raised ESR, hypertension, anaemia, weight loss etc.). The typical triad of pain, flank mass and microscopic hematuria is rare. Two-thirds of the RCC are diagnosed incidentally at Rosing stage-II and majority is of clear-cell sub type.

Key words: Renal cell carcinoma, clinical and pathological characteristics etc.

ORIGINAL

INTRODUCTIO N:

Renal cell carcinoma is a group of malignancies arising from the epithelium of the renal tubules.[1] Overall, approximately 12 new cases are diagnosed per 100,000 populations per year, with a male-to-female ratio of 3:2. Worldwide, the mortality from renal cell carcinoma is estimated to exceed 100,000 per year. Renal cell carcinoma occurs predominantly in the sixth to eighth decades of life.[2] It is uncommon in patients younger than 40 years and rare in children.[3] Most sporadic RCCs are unilateral and unifocal. Bilateral involvement is found in 2 to 4% of cases.

Authors' information:

[1] ***Dr. Md. Mohiur Rahman Khan***, *Registrar, Department of urology, BIRDEM (Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders) General Hospital, 122 Kazi Nazrul Islam Avenue, Dhaka-1000, Bangladesh*

[2] ***Dr. Muhammad Raaqul Hassan***, *Assistant registrar, department of urology, BIRDEM (Bangladesh Institute of Research and Rehabilitation in Diabetes, Endocrine and Metabolic Disorders) General Hospital, 122 Kazi Nazrul Islam Avenue, Dhaka-1000, Bangladesh*

[3] ***Dr. Fahmin Rahman***, *MBBS, MPH, Department of Public Health, North South University (NSU), Bashundhara, Dhaka-1229, Bangladesh.*

[4] ***Prof. ATM Mowladad Chowdhury***, *FCPS (Surgery), MRCSED, MRCPS, MS (Urology), Department of Urology, BIRDEM General Hospital & Ibrahim Medical College, Dhaka.*

Correspondence: ***Dr. Md. Mohiur Rahman Khan***, *Phone: +880 1727346249 E-mail: babumohiur@yahoo.com*

Multicentricity, found in 10-20% of cases, is more common in association with papillary histology and familial RCC. One unique feature of RCC is its predilection for involvement of the venous system (in 10% of RCCs), more often than in any other tumor type. The tumor can extend directly into the perinephric fat, ipsilateral adrenal gland, or adjacent musculature, and, less frequently to the liver, spleen, pancreas, and colon. Rarely, the tumor may invade the renal collecting system. RCC has a propensity for extending, as tumor thrombus, into the tributaries of the renal veins and subsequently to the main renal vein, the inferior vana cava, the hepatic veins, and potentially to the right atrium. Hematogenous metastases are more common and occur earlier than lymphatic dissemination, the former most commonly to the lungs and bone, but essentially to any organ, including the subcutaneous tissues and skeletal muscle. Nuclear features can be highly variable. Grading is primarily based on nuclear size and shape and the presence or absence of prominent nucleoli. Fuhrman's system has been most generally adopted and is now recognized as an independent prognostic factor for RCC in general and for clear cell RCC in particular.[4]

The classic clinical presentation of flank pain, hematuria, and a palpable flank mass is comparatively uncommon (5-10% of cases). The clinical symptomatology may be quite nonspecific for example, anorexia, tiredness, weight loss, or fever of unknown origin.[5-9] RCC is also more common in long-term dialysis carrying a three-to six-fold increased risk compared with the non-dialysis population. Incidentally detected tumors in asymptomatic individuals have been steadily increasing with the dissemination of imaging techniques, including CT, MRI, and sonography, accounting for approximately 60% of renal tumors in the 1990s, compared with approximately 10% in the early 1970s.[10-11]

Among all the incidentally diagnosed tumours, RCC is a tumour that progresses aggressively and becomes life-threatening in the terminal stage. Prognosis is influenced by the extent of disease at diagnosis, with a 5-year survival rate in the absence of metastases exceeding 50%; in the presence of distant metastases, the 5-year survival rate decreases to 10% and a 10-year survival rate of < 5%. The tumour is not well-responding to the conventional chemo and radiotherapy and still radical nephrectomy is the treatment of choice which in many cases is curative. With the advent of modern facilities and diagnostic aids, more and more cases are being diagnosed now a day. So, a clinicopathological study of RCC is imperative which might update the medical community about different clinicopathological aspects of the tumours– essential for the early diagnosis of RCC. The present study was, therefore, intended to find the usual mode of presentation of RCC with peak age incidence, gender affinity and laterality. The study was also intended to find histologic details of the tumours.

METHODS:

This Cross-sectional descriptive study was carried out in the Department of Urology, BIRDEM General Hospital and Dhaka Medical College Hospital over a period 10 months from June 2013 to March 2014. All FNA positive renal cell carcinomas were included in the study. Renal tumours other than renal cell carcinoma diagnosed by FNA, such as, angiolipoma, renal cyst, and renal tuberculosis were excluded. A total of 100 renal cell carcinoma patients, irrespective of age and sex, were selected and their anatomical distribution, clinical presentation, stage at presentation and histopathological type were studied. Having obtained ethical clearance from the Ethical Committee and verbal consent from the patients, the data collection was commenced. Data processing and analysis were done using SPSS (statistical package for social sciences), version 17. The test statistics used to analyze the data were descriptive statistics.

RESULTS:

Demographic characteristics of the patients show that 70% patients were between 46-55 years old, 14% between 56-65 years, 8% between 66-75

years, 6% between 35-45 years, and 2% above 75 years old. The median age at diagnosis was 52.3 years and the youngest and the oldest patients were 35 and 78 years old respectively. Three-quarters (75%) of the cases of renal cell carcinoma were male and the rest 25% were female (male to female ratio is 3:1) (Table I). Over half (53%) of the cases of RCC had their lesion in right kidney and 47% in the left kidney. In 55% cases the lesion occurred in upper pole and in 45% cases in lower pole. Two-thirds (67%) of the patients were diagnosed incidentally, 23% presented with pain and heamaturia and 10% with loin mass (Table II). On physical examination and laboratory investigation, a sizable proportion of the patients was found to have paraneoplastic syndrome [raised ESR (60%), hypertension (50%), anaemia (40%), weight loss (15%), pyrexia (2%) and hypercalcamia (2%)] (Table III). CT scan of the tumour revealed that, 60% were between 3-7 cm, 30% were more than >7 and 10% <3 cm. Two-thirds (66%) of RCC cases were diagnosed at Robsing Stage II, 20% at stage III (of them 8% had renal vein or inferior venacaval involvement and 12% had nodal involvement) & 12% at stage I and 2% at stage IV disease. Staging was done pre-operatively by CT scan according to Robsing staging system (Table IV). Histopathological diagnosis showed that 70% had clear cell sub-type RCC, 20% papillary sub-type, 5% chromophobe and 5% were of other subtypes (such as collecting duct, medullary carcinoma, renal cell carcinoma and unclassified) (Figure 1).

Table I: Distribution of patients by their demographic characteristics (n=100)

Demographic characteristics	Frequency	Percentage
Age (years)		
35-45	6	6.0
46-55	70	70.0
56-65	14	14.0
66-75	8	8.0
>75	2	2.0
Sex		
Male	75	75.0
Female	25	25.0

Table II: Distribution of patients by site of lesion & clinical presentation (n=100)

Site of lesion & clinical presentation	Frequency	Percentage
Site of lesion		
Right kidney	53	53.0
Left kidney	47	47.0
Upper polar	55	55.0
Lower polar	45	45.0
Clinical presentation		
Abdominal pain and heamaturia	23	23.0
Lion Mass	10	10.0
Incidental diagnosis	67	67.0

Table III: Distribution of patients by paraneoplastic syndrome (n=100)

Paraneoplastic syndrome	Frequency	Percentage
ESR	60	60.0
Hypertension	50	50.0
Anaemia	40	40.0
Weight loss	13	13.0
Pyrexia	02	02.0
Hypercalcernia	02	02.0

Table IV: Distribution of the patients by the size and stage of the tumours (n= 100)

Size and stage of the tumours	Frequency	Percentage
Sizeof the tumour (cm)		
<3	10	10.0
3-7	6	60.0
>7	30	30.0
Stage of disease (Robsing staging)		
Stage I (tumour confined within the renal capsule)	12	12.0
Stage II (tumour invasion to the perinephric fat but confined to the fascia Gerota)	66	66.0
Stage III (renal vein/inferiorvenacaval involvement +nodal involvement)	20	20.0
Stage IV (extra renal metastasis-adrenal, splenic, liver, bone, lungs	2	2.0

ORIGINAL

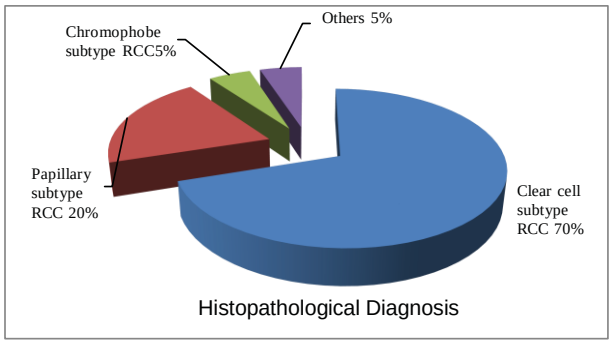

Fig.1 Distribution of patients by their histopathological diagnosis

DISCUSSION:

All the 100 cases of renal carcinoma provisionally diagnosed clinically and CT scan were finally confirmed by histo-pathological examination. In our study, 70% of patients presented between 46-55 years of age with median age at diagnosis being 52.3 years indicating that the peak age-incidence of the RCC in our country is between 4th and 5th decades of life. Studies conducted in Czech Republic[12] Brazil[13] and Columbia University[14] demonstrated higher median age at diagnosis (62, 60 & 61 years respectively). Chow and Deves[5] and Zubacet al[15] showed most RCC to present in the fifth to seventh decade of life with median age at diagnosis being 66 years. As the present study was conducted in the two hospitals of Dhaka city, the findings do not represent the true picture of a cross-section of population and as such they lack generalization. In terms of sex distribution, 75% was male with male to female ratio being 3:1. In a review study in Columbia University, Medical Centre, New York Database, out of 1105 patients of RCC, two-thirds (66.1%) were male and one-third (33.8%) was female and in another study conducted in Brazil, out of 508 patients of RCC, nearly 60% were male with male to female ratio being 6:4.[13] In a study in Kathmandu, out of 50 patients with RCC, 64% were male and 36% were female.[16] Zubac et al[15] also showed a male-female ratio of 2:1. Thus, it is evident from the above-mentioned studies, that RCC cases are predominantly male which is consistent with the findings of the present study.

In our study, we found that 53% cases of RCC had their lesion in right kidney and 55% were located in the upper pole. In a study, Tribhuvan University Teaching Hospital, Kathmandu showed RCC to occupy upper pole of the kidney in 40% of cases.[16] In a retrospective review analysis in the University College Hospital, Ibadan showed that the right kidney was more commonly affected (58.6%).[17] The reason why RCC occurs in right kidney preferably in upper pole is still not known. Plebani[18] showed that ESR plays a major part in paraneoplastic syndrome in RCC and in another study[19], ESR was identified as a significant independent prognostic factor in patients with localized RCC. In Campbell-Walsh Urology (edition, 10) the author says that in RCC, paraneoplastic syndromes are found in 20% of patients. Among these raised ESR was found in 55.6%, hypertension in 37.5%, anaemia in 36.3%, weight loss in 34.5%, pyrexia in 17.2%, abnormal Liver Function Tests (LFT) in 14.4%, hypercalcemia in 4.9%, polycythemia in 3.5%. neuromyopathy in 3.4 % & amyloidosis in 2.0% casas.[1] In the above study, abnormal liver function test, polycythemia, amyloidosis are included as paraneoplastic syndrome. But in our study we are unable to show these as paraneoplastic syndrome. The reason is that these investigations are not frequently done in our country, so we did not have enough data to present these signs and symptoms in our study. About 60% of RCCs were between 3-7 cm, 30% were more than 7 cm and 10% were less than 3 cm. In a study conducted by Crispenet al[20] showed that tumour size more than 10cm had chance of lymph node metastasis in 38% cases. In a Japanese study, Okudaet al[21] showed that if RCC tumour size is less than 5 cm, nephron sparing surgery can be done which is further supported by Ljungberget al.[22] These studies also reported that tumour size < 5 cm has less chance of metastasis and in these cases nephron sparing surgery is possible. In our study most of the tumours was of size 3-7 cm.

In our study we found that 67% patients were diagnosed as RCC incidentally, 23% presented with pain and hematuria and 10% presented with loin mass. Tatsuya et al[23] from Japan and Bazaev [24] et al from Russia reported that more than 65% of the patients were diagnosed incidentally. In

another study, out of 50 patients with RCC, the typical triad of pain, flank mass and microscopic hematuria was present in only 4% cases.[16] Choykeet al[27] showed that the classic clinical presentation of flank pain, hematuria, and a palpable flank mass is comparatively uncommon (5-10% of cases). However, clinical symptomatology may be quite nonspecific for example, anorexia, tiredness, weight loss, or fever of unknown origin or varicocele formation (from tumor thrombus in the left renal vein or the inferior vena cava) and disseminated malignancy.

Histological examination showed that nearly two-thirds (66%) of the patients were diagnosed in Robsing Stage II and 20% in stage-I. Poprach et al[12] demonstrated that out of 544 patients of RCC, 46.5% were diagnosed as stage I, 10.7% as stage II, 13.1% as stage III and 20% as stage IV, while Bazaev et al[24] showed most of the RCCs are diagnosed in stage I and stage II. Igarashi and colleagues[25] found that 4% patients had apparent tumour thrombi in the main renal vein and 6% had distant metastasis at the time of operation. O'Malley et al[26] showed that only 2% cases of RCC had adrenal gland metastasis. In our study out of 100 patients 8 had renal vein or IVC extension and only 2 cases had distant metastasis to adrenal gland. In the present study, 70% of the cases were diagnosed as clear cell sub-type RCC and 20% as papillary sub-type. Several studies reported that clear-cell sub-type RCC formed the majority (around 80%)[2,12,16] Kovacs & associates[27] showed clear cell adenocarcinoma to form the majority (80%) followed by papillary (15%), chromophobe (5%), collecting duct (1%) and unclassified (4%) sub-type.

CONCLUSION:

Renal cell carcinoma is a highly aggressive tumour and generally occurs in older persons (between 4th and 5th decades of life) with a male predilection. It occurs mainly in right kidney preferably in the upper pole. Patients usually present with paraneoplastic syndrome (raised ESR, hypertension, anaemia, weight loss etc.). The typical triad of pain, flank mass and microscopic hematuria is rare. Two-thirds of the RCCs are diagnosed incidentally at Rosing stage-II. Histologically majority is of clear-cell sub type. If detected early, young patients with Robsing stage I may have better overall 5 years survival rates.

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INTRODUCTIO N:

According to the World Health Organization (WHO), every neonate of less than 2,500 grams at birth is classified as low birth weight (LBW). In underdeveloped and developing countries the problem of LBW neonates is alarming. WHO estimates that globally about 25 million LBW neonates are born each year comprising 14% of all live-births. Nearly 93% of them are in developing countries.[1] Striking variation exists in LBW prevalence within Asia: the highest rates are in South Asia and the lowest in East Asia.[2] In South Asia, the problem is most acute with up to 50% of all neonates having LBW.[2] Up to 25% of neonates in Pakistan are classified as LBW.[3] In India 30-35% babies are LBW and more than half of these LBW are term neonates.[4] The LBW rate was 22.6% and more among girls and in slums [National Low Birth Weight Survey (NLBWS), 2015]. A significant proportion of LBWs are term LBWs (IUGR). Presently more than 20% of the neonatal death in Bangladesh is due to LBW and its complications.

Compared to term appropriate for gestational age neonate, term LBW neonate has a higher incidence of morbidity and mortality. Nonetheless, in global terms, children born with LBW are 20-fold more likely to die prematurely compared to children of normal birth weight.[7] Likewise, some of these children may experience more devastating, detrimental morbidity, both in the short and long term. Among these, the principal comorbidities among some severely affected term LBW such as in IUGR include congenital birth defect, perinatal asphyxia, meconium aspiration, pulmonary hemorrhage, persistent pulmonary hypertension, hypotension, hypoglycemia due to depletion of glycogen store and subcutaneous fat, hypothermia, hypocalcemia, neutropenia, polycythemia, thrombocytopenia, renal insufficiency.[8] Some term LBW neonates are at higher risk for poor postnatal growth, neurologic impairment, delayed cognitive development, poor academic achievement. In adult life, some severely affected term LBW neonates such as in IUGR have a higher risk of coronary heart disease, hypertension, non-insulin dependent diabetes, stroke, obstructive pulmonary disease, renal impairment, decreased reproductive function.[8] Therefore, it is clear that term LBW neonate represents a heavy burden for healthcare services worldwide. In poorer countries where fewer resources are destined for health care. In addition, the weight of a newborn at birth is an important indicator of maternal health and nutrition prior to and during pregnancy. There are numerous maternal and fetal factors contributing to LBW at term. Among maternal factors maternal undernutrition, anemia and medical illness, inadequate prenatal care, obstetric complications and maternal history of premature LBW infants, low socioeconomic status have all been reported to influence the occurrence of LBW.[8] A study conducted by Nagargojeand associates suggested that mothers' education, occupation, socio-economic status, physical activity during pregnancy, sleep and rest duration, age at marriage, tobacco consumption, time of registration of pregnancy, number of antenatal visits, tetanus toxoid immunization, days of iron, folic acid and calcium supplements, all are found to be significantly associated with LBW.[9] These factors operate to various extents in different environment and cultures and therefore vary from one area to another, depending upon geographic, socio-economic and cultural factors. These maternal risk-factors are biologically and socially interrelated, and most are modifiable. The morbidity and mortality of LBW can, therefore, be reduced if the maternal risk factors are detected early and managed properly.

As developing countries are experiencing rapid demographic transitions due to advancement of education, socioeconomic status and urbanization, the pattern of risk factors contributing to LBW also seems to be changing. Besides, most of the studies on LBW and its risk factors were conducted in community setting. Hospital-based study on the issue, particularly on the issue of term LBW and its risk factors is lacking. Therefore, this study was carried out in a referral tertiary hospital in the context of Bangladesh with the objective of identifying proportion of term LBW and maternal risk factors associated with it.

METHODS:

This case-control study was conducted in the Department of Obstetrics & Gynaecology, Bangabandhu Sheikh Mujib Medical University (BSMMU) Hospital, Dhaka over a period of 15 months between April 2017 to June 2018. Term LBW neonates delivered at the above-mentioned hospital were taken as cases, while the term normal weight neonates delivered in the same place was taken as controls. Only term neonates (delivered after 37 completed weeks to 42 completed weeks of gestation) with neonatal age <24 hours and mothers having complete medical record and informed consent for the study were included in the study. Preterm neonates (delivered before 37 completed weeks), Post-term neonates (after 42 completed weeks), twins were excluded from the study. Ethical Clearance was obtained from the Institutional Review Board (IRB) of Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka.

Convenient sampling technique was employed to include the required number of patients. The outcome or dependent variable was birth weight of the neonates, while the exposure or independent variables were categorized into three groups. Maternal age, education, height, occupation was included in sociodemographic variables. Maternal anaemia, hypertension, diabetes mellitus, UTI was included in medical conditions or diseases, Past history of LBW baby, abortion, still birth, parity, birth spacing and number of ANC visits, timing of 1st ANC visit was included in past and current obstetric history. Birth weight of every neonate was measured by an electronic weighing scale (RoHS Model-ER7210 China) which is accurate to ± 5 g and was calibrated before each measurement. Weight was taken by keeping the neonate undressed. Birth weight of the neonate less than 2500 gm was labeled as LBW (case) and birth weight from 2500 to 4000 gm as normal weight (control). A total of 80 cases and 140 controls who met the eligibility criteria were consecutively included in the study.

Gestational age was calculated from the menstrual history provided the dates were sure and the menstrual cycles were regular and there was no history of using oral contraceptives in the 3 months before conception. If any of the above criteria were not met to determine the gestational age, then the result of the earliest ultrasound scan if available, was used to calculate the gestational age. Data about the maternal exposure to different risk factors was recorded using a pretested questionnaire. Information was collected from mothers with face to face interviews, from medical records and by post-partum maternal examination within 72 hours of delivery and all information was cross-checked with the available records such as ANC cards, investigation reports, previous discharge report and case sheets to minimize the recall bias. Mother's standing height was measured to the nearest 0.1 cm, making the mother stand against the measuring tape attached on a wall.

Data processing and analysis were done using SPSS (statistical package for social sciences), version 25. All the demographic, clinical and obstetric factors were then compared between the case and control groups to find the predictors of LBW. The test statistics used to analyze the data were descriptive statistics and Chi-square (χ^2). Categorical data were compared between groups using Chi-square (χ^2) Test. The risk of having low birth-weight due to a factor was calculated using Odds Ratio (OR) with its 95% confidence interval (CI). The stepwise backward regression was done to find the good-fit model which could predict the outcome of interest (birth-weight). Insignificant Chi-square produced by Hosmer and Lemeshow goodness-of-fit test was taken as evidence of good-fit model. For all analytical tests, the level of significance was set at 0.05 and $p < 0.05$ was considered significant.

RESULTS:

The present case-control study aimed at determining the predictors of low birth weight included a total of 80 low birth weight (birth weight < 2500 gm) neonates (within 24 hours of birth) as case and 140 neonates of normal birth weight (birth weight ≥ 2500 gm) were included as control. During the study period a total of 590 mothers delivered at our

hospital. Of them, 430 were term birth, 151 were preterm, and 9 post-term births. Of the 430 term births, 80 were low birth weight neonates giving a proportion of term LBW to be 18.6%.

UNIVARIATE ANALYSIS:

Majority of the mothers of both case and control groups were ≥ 18 years old. Maternal age was not found to be associated with low-birth weight of the neonates (p = 0.659). Occupation data show that housewives tend to have term low birth weight babies more often than the service-holders (p = 0.003) with risk of having term LBW neonates is more than 4 times (95% CI = 1.5 – 11.0) higher (Table I). Fifty percent of the LBW neonates had their mothers with short stature as compared to 30% of the control group (p = 0.003). The risk of having LBW neonates due to short stature of mothers is 2.3 (95% CI = 1.3 – 4.1) times higher than the normal height mothers (Table-I). Of the obstetric characteristics, primipara was more likely to deliver LBW babies than did the multipara (p = 0.017). Pregnant women with inadequate number of ANCs (< 4 visits) were also prone to have term LBW babies than those with adequate ANCs (p = 0.038). The primipara and the mothers who made < 4 ANC visits carry 2.0(95% CI = 1.1–3.7) and 2.2(95% CI = 1.0 – 4.9) times more risk of giving birth to LBW babies respectively. Mothers who made their 1st ANC visit in the 2nd or 3rd trimester had 4.5(95% CI = 2.2 – 9.1) times higher risk of delivering LBW neonates compared to those who made their 1st visit in the 1st trimester (p < 0.001) (Table II). Mothers who maintained a narrow birth spacing (< 2 years) between two consecutive births had a significantly more LBW babies than the mothers who maintained an adequate birth spacing (2 years or more) (p = 0.011) with risk of having LBW neonates in the current pregnancy was estimated to be more than 3-fold (95% CI = 1.2 – 7.9) higher (Table II). Of the 4 medical diseases analyzed, only hypertension during pregnancy was found to significantly influence the birth weight of neonates with hypertensive women more frequently having term LBW neonates than the normotensive ones (p < 0.001). The risk of delivering term LBW neonates by hypertensive women being 5.4(2.7 – 10.8) times greater. Urinary tract infection (UTI) was considerably higher in the case group than that in the control group, although the difference did not turn significant (p = 0.227). (Table III).

Table I. Association between maternal demographic characteristics and term LBW

Demographic characteristics*	Group		p-value	OR (95% of CI of OR)
	Case (n = 80)	Control (n = 140)		
Maternal age (years)				
< 18	5(6.2)	11(7.9)	0.659	
≥ 18	75(93.8)	129(92.1)		
Occupation				
Housewife	75(93.8)	110(78.6)	0.003	4.1(1.5-11.0)
Service-holder	5(6.2)	30(21.4)		
Height (cm)				
< 150 (short stature)	40(50.0)	42(30.0)	0.003	2.3(1.3 – 4.1)
≥ 150 (normal stature)	40(50.0)	98(70.0)		

Figures in the parentheses denote corresponding %.
*Data were analyzed using Chi-squared (χ^2) Test

Table II. Association between obstetric characteristics term LBW

Obstetric characteristics*	Group		p-value	OR (95% of CI of OR)
	Case (n = 80)	Control (n = 140)		
Parity				
Primipara	31(38.8)	33(23.6)	0.017	2.0(1.1 – 3.7)
Multipara	49(61.3)	107(76.4)		
Past H/O abortion				
Yes	11(22.4)	25(25.5)	0.684	0.84(0.37– 1.9)
No	38(77.6)	73(747.5)		
Past H/O LBW				
Yes	17(36.2)	39(38.6)	0.775	0.9(0.4 – 1.8)
No	30(63.8)	62(61.4)		
Past H/O still-born				
Yes	10(20.4)	15(14.0)	0.313	1.5(0.7 – 3.8)
No	39(79.6)	92(86.0)		
ANC visits				
<4	16(20.0)	14(10.0)	0.038	2.2(1.0 – 4.9)
≥4	64(80.0)	126(90.0)		
Timing of 1st visit				
2nd & 3rd trimester	28(35.0)	15(10.7)	< 0.001	4.5(2.2 – 9.1)
1st trimester	52(65.0)	125(89.3)		
Birth spacing (yrs)				
< 2	12(24.5)	10(9.3)	0.011	3.1(1.2 – 7.9)
2 or more	37(75.5)	98(90.7)		

Figures in the parentheses denote corresponding %.
*Data were analyzed using Chi-squared (χ^2) Test

Table III. Association of medical diseases in pregnancy with term LBW

Medical diseases during pregnancy*	Group: Case (n = 80)	Group: Control (n = 140)	p-value	OR (95% of CI of OR)
Anaemia				
Yes	38(47.5)	58(41.4)	0.382	1.2(0.7 – 2.2)
No	42(52.5)	82(58.6)		
Hypertension				
Yes	33(41.3)	16(11.4)	< 0.001	5.4(2.7 – 10.8)
No	47(58.8)	124(88.6)		
DM				
Yes	10(12.5)	20(14.3)	0.710	0.9(0.4 – 1.9)
No	70(87.5)	120(85.7)		
UTI				
Yes	11(13.8)	12(8.6)	0.227	1.7(0.7 – 4.1)
No	69(86.2)	128(91.4)		

Figures in the parentheses denote corresponding %.
*Data were analyzed using Chi-squared (χ^2) Test

Binary logistic regression analysis: Model Fit

The stepwise backward regression was done to find the good-fit model which could predict the outcome of interest (birth-weight). All the 7 maternal variables found to be significantly associated with term LBW in univariate analysis at 5% level of significance were entered into the model. Hosmer and Lemeshow goodness-of-fit test demonstrated that the model was not a good-fit-model (p = 0.088), for the correct prediction of term LBW with this model was only 38.8%, although the model could correctly predict NBW in 94.4% cases (Table IV& V). Stepwise regression model comprised with 6 variables (maternal occupation, stature, parity, number of ANC received, timing of 1st ANC and maternal blood pressure during pregnancy) formed the best fitting model, as evidenced by insignificant Chi-square produced by Hosmer and Lemeshowgoodness-of-fit test (p = 0.350). The model could correctly predict the outcome in 72.7% of the cases with correct prediction of outcome of interest (LBW) being 48.8% (VI&VII).

Table IV. Hosmer and Lemeshow Test for model fit with 7 variables

Step	Chi-square	df	Sig.
1	12.416	7	0.088

Table V. Capability of the model with 7 variables in predicting outcome

	Observed		Predicted: Outcome LBW	Predicted: Outcome NBW	Percentage Correct
Step 1	Outcome	LBW	19	30	38.8
		NBW	6	102	94.4
	Overall Percentage				77.1

Table VI. Hosmer and Lemeshow Test for model fit with 6 variables

Step	Chi-square	df	Sig.
1	6.694	6	0.350

Table VII. Capability of the model with 6 variables in predicting outcome

	Observed		Predicted: Outcome LBW	Predicted: Outcome NBW	Percentage Correct
Step 1	Outcome	LBW	39	41	48.8
		NBW	19	121	86.4
	Overall Percentage		---	---	72.7

Table VIII demonstrates the binary logistic regression analysis of Odds Ratios for maternal characteristics/ factors likely to cause term LBW. Of the 6 variables with which the regression model was formed, inadequate ANC, 1st ANC visit in 2nd trimester onwards, & maternal hypertension during pregnancy emerged as independent predictors of LBW in multivariate analyses. The mothers with inadequate ANC and 1st ANC visit made in 2nd or last trimester were 3.7(95% CI = 0.65 – 20.7) and 7.5(95% CI = 1.5 – 37.2) times more likely to have term LBW neonates (p = 0.032 and p = 0.013 respectively). Hypertensive mothers were 3.7(95% CI = 1.8 – 7.9) more likely to have term LBW neonates compared to their normotensive counterparts (p < 0.001).

Table VIII. Regression analysis showing predictors of LBW

Variables of interest	Univariate analysis (p-value)	Multivariate analysis: Odds Ratop (95% of CI of OR)	Multivariate analysis: p-value
Short stature (< 150 cm)	0.003	0.60(0.32 – 1.14)	0.234
Parity (Primipara)	0.017	1.23(0.67 – 2.60)	0.524
Occupation (Housewife)	0.003	1.23(0.67 – 2.60)	0.289
ANC visits < 4	0.038	3.7(0.65 – 20.7)	0.032
1st visit ANC in 2nd & 3rd trimester	< 0.001	7.5(1.5 – 37.2)	0.013
Maternal hypertension (mmHg)	< 0.001	3.7(1.8 – 7.9)	< 0.00

DISCUSSION:

Low birth weight in preterm births is quite arguable and is difficult to prevent. But low birth weight in term neonates does not stand to reason and is difficult to accept. Nevertheless, more than three-quarters (77%) of LBW neonates in Bangladesh are growth retarded (IUGR) confirming that intrauterine growth retardation is the major cause of LBW in Bangladesh.[10] In most cases the maternal factors contributing to LBW in term neonates could be prevented. This study focused on proportion of term LBWs in a tertiary hospital and its maternal factors so that preventive measures could be suggested to reduce its occurrence.

In the present study the proportion of term LBW was 18.6% (80 out 430 term births). This was quite expected as the study was carried out in BSMMU Hospital (a tertiary care hospital) where many of the pregnant women are referred from the peripheral hospitals because of high risk pregnancies. The finding is somewhat higher than a study from Pakistan (10.6%) and much lower than a Central Indian study findings (33%).[11, 12]

The maternal factors (that may contribute to the development of LBW neonates) studied were demographic characteristics, past & current obstetric histories and medical conditions or disease during the current pregnancy. Uunivariate analysis showed that housewives and short statured mothers carry 4(95% CI = 1.5 – 11.0) and 2.3(95% CI = 1.3 – 4.1) times higher risk of having LBW neonates at term respectively. Several studies found significant association between occupation and low birth weight with housewives being more at risk of having LBW neonates.[13,14,15] It could be due to hard physical work during pregnancy, lack of rest, lack of consumption of nutritious food during pregnancy. However, several other studies did not find any significant association between maternal occupation & low birth weight.[12,16,17]

Of the obstetric characteristics, primipara and pregnant women with inadequate number of ANCs (< 4 visits) were more prone to have LBW babies with risk of having the condition being 2.0(95% CI = 1.1 – 3.7) and 2.2(95% CI = 1.0 – 4.9) times greater respectively ($p = 0.017$, $p = 0.038$ and $p < 0.001$). Mothers who made their 1st ANC visit in the 2nd and 3rd trimester had 4.5(2.2 – 9.1) times higher risk of delivering LBW neonates ($p < 0.001$). Teklehaimanotet al[18] reported that burden of low birth weight deliveries in North Ethiopia was associated with inadequate ANC service utilization and unwanted pregnancy. Mumbareet al[19] reported 62.4% mothers who delivered term LBW babies did not receive adequate antenatal care. Dai et al[20] suggested that increasing number of prenatal visits decrease the risk of LBW which appears to be in agreement with the present study. Provision of adequate ANC is expected to reduce the risk of LBW. It creates health awareness and timely identification of complications. In the present study mothers who maintained a narrow birth spacing (< 2 years) had a significantly more LBW babies with likelihood of developing the condition being 3-fold (95% CI = 1.2 – 7.9) higher than the mothers who maintained an adequate birth spacing ($p = 0.011$). Of the 4 medical diseases analyzed, only hypertension during pregnancy tend to be significantly associated with LBW neonates with odds of having the condition being 5.4(2.7– 10.8) times greater than in the normotensive ones ($p < 0.001$).

But after adjustment by binary logistic regression analysis, only three maternal factors (inadequate ANC, 1st ANC visit in 2nd trimester or onwards, and maternal hypertension during pregnancy) emerged as independent predictors of term LBW. The mothers with inadequate ANC and 1st ANC visit made in 2nd or last trimester were 3.7(95% CI = 0.65 – 20.7) and 7.5(95% CI = 1.5 – 37.2) times more likely to have LBW neonates ($p = 0.032$ & $p = 0.013$) respectively. Hypertensive mothers were 3.7(95% CI = 1.8 – 7.9) times more prone to have LBW neonates compared to their normotensive counterparts ($p < 0.001$). Consistent with these findings, Mumbare and associates in a study similar to the present study observed birth spacing < 36 months, maternal height ≤ 145 cm, pre-delivery weight ≤ 55 kg, pregnancy weight gain ≤ 6 kg, exposure to tobacco, inadequate antenatal care, maternal hypertension, low socio-economic status, maternal anemia and less maternal education to be associated with the delivery of a low birth weight infants.[19] Conditional logistic

regression analysis showed that significant risk factors associated with low birth weight were inadequate ANC (OR = 4.98, 95% CI: 2.64 to 9.39), maternal weight before delivery ≤ 55 kg (OR = 4.81, 95% CI: 2.53 to 9.15) and height ≤ 145 cm (OR-4.13, 95% CI-2.04 to 8.37) which compare well with our study findings.

Khan et al[11] found low socio-economic status, primiparity, short maternal height and inadequate antenatal care to be associated with low birth weight at term. Bhaskaret al[21] found maternal height, iadequate ANC visits, time of first antenatal care visit, and hypertension as the significant predictors of LBW which are all consistent with the findings of the present study. Although several studies found strong association of term LBW with anaemia,[11,12,14,19,22] the present study failed to demonstrate such association.

Data presented highlight a number of risk factors relevant to term low birth weight. These findings provide insights into the health workforce, health policies, health information and community mobilization relevant to prevention of term low birth weight (IUGR). The information provided here can be used to identify the most important risk factors to target and gaps in care in order to identify and implement solutions for improved outcomes. Finally, like any other scientific study, the present study is not without limitation. Certain variables like number of ANC visits made, timing of 1st ANC visit were subjectively evaluated which may either be underestimated or overestimated due to recall bias. Therefore, caution is advised to interpret these data, particularly in case of generalization of the findings to reference population. Certain maternal factors like pre-pregnancy weight, weight gain during pregnancy, nature of work during pregnancy (light work or hard labor) and food behavior which were though relevant to this study were not feasible to be included.

Conclusion:

From the findings of the study it can be concluded that three maternal factors – inadequate ANC, 1st ANC visit in 2nd or 3rd trimester and maternal hypertension during pregnancy are the independent predictors of term LBW. The mothers with inadequate ANC and 1st ANC visit made in 2nd or last trimester and hypertension carry much higher risk of delivering term LBW compared to their respective counterparts in the same population. Controlling for maternal risk factors for term LBW neonates will go a long way in reducing the incidence of term LBW neonates.

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Perception and Practice of Diabetic Patients about Hypoglycemia

Md. Jawadul Haque,[1] Chinmoy Kanti Das,[2] Md. Entekhab-Ul-Alam,[3] Md. Nurul Amin,[4] Jubaida Afroza Siddiqua,[5] Farzana Hasan,[6]
Milon Kumar Haldar,[7] Nelofar Yasmin,[8] Shathi Kumar Rawson Kamal Md. Abu Syem Shah Amanath Ullah,[9] Farhana Yasmin [10]

ABSTRAC T

Background & objective: Diabetes is major global epidemic with an ever-increasing trend. For diabetic patients hypoglycemia is a fact of life. The gravity of the problem demands that the diabetics must be aware about the symptoms of hypoglycemia as well as its immediate corrective measures to overcome the crisis. But, a substantial proportion of diabetic patients is unaware of all the symptoms of hypoglycemia leading to delayed management. This study was intended to assess the diabetic patients' perception about hypoglycemia.

Methods: The study was carried out in the Department of Community Medicine, Rajshahi Medical College, Rajshahi over a period of 2 months from April 2018 to May 2018. The diabetic patients in the rural area of Puthia Upazila were the respondents (study population). A total of 107 diabetic patients were consecutively included in the study. A self-administered questionnaire containing the variables of interest for evaluating perception of the respondents about diabetic hypoglycemia was used. Respondents' level of knowledge about hypoglycemia was measured using Likert Scale Score. Score '1' was assigned for each correct answer and score '0' for each wrong answer. As there were more than one question in assessing respondents' level of knowledge, combined scores were used to measure respondents' perception about hypoglycemia.

Result: Over one-third (36.4%) of the respondents was middle aged (40 – 50 years old) and 29% were upper middle aged (50 – 60 years old) with mean age of the respondents being 51.3 years (range: 30-93 years). Approximately 55% were male with male to female ratio being roughly 11:9 More than two-thirds of the respondents took measures to control diabetes and their compliance to treatment was also commendably high (83%). The proportion of controlled diabetics was no less (57%). But their knowledge about common symptoms and causes of hypoglycemia was poor (no more than 25% on an average). The knowledge about measures to be taken to correct hypoglycemia was even poor (no more than 20% on an average). The perception of the significance of symptoms of hypoglycemia and the importance of their correction were disappointingly low (< 10%). Overall half (49.5%) of the respondents had very poor level of knowledge, over one-third (34.6%) had poor knowledge, 13.1% had average knowledge and only 2.8% had good knowledge about symptoms of hypoglycaemia.

Conclusion: The study concluded that over two-thirds of the diabetic patients of Puthia Upazilla adopt measures to control diabetes and their compliance to treatment is appreciably high. The proportion of controlled diabetes is also appreciable. But their knowledge about symptoms, causes of hypoglycemia, measures to be taken to correct hypoglycemia and the importance of taking immediate measure to correct hypoglycemia are all inappreciably low.

Key words: Perception, practice, hypoglycemia, diabetic patients etc.

ORIGINAL

Authors' information:

[1] ***Dr. Md. Jawadul Haque***, *Professor & Head, Department Community Medicine, Rajshahi Medical College, Rajshahi, Bangladesh.*

[2] ***Prof. Dr. Chinmoy Kanti Das***, *Professor, Department of Community Medicine, Rajshahi Medical College, Rajshgahi.*

[3] ***Dr. Md. Entekhab-Ul-Alam***, *MBBS, DPH (DU), Assistant Professor, Department of Community Medicine, Rajshahi Medical College, Rajshgahi.*

[4] ***Dr. Md. Nurul Amin***, *Assistant Professor, Department of Community Medicine, Rajshahi Medical College, Rajshahi & Executive Editor, Ibrahim Cardiac Medical Journal, Ibrahim Cardiac Hospital & Research Institute, Shahbag, Dhaka.*

[5] ***Dr. Jubaida Afroza Siddiqua***, *Lecturer, Department of Community Medicine, Rajshahi Medical College, Rajshgahi.*

[6] ***Dr. Farzana Hasan***, *Medical Offcer, Department of Community Medicine, Rajshahi Medical College, Rajshgahi.*

[7] ***Dr. Milon Kumar Haldar***, *Lecturer, Department of Community Medicine, Rajshahi Medical College, Rajshgahi.*

[8] ***Dr. Nelofar Yasmin***, *Lecturer, Department of Community Medicine, Rajshahi Medical College, Rajshgahi.*

[9] ***Dr. Shathi Kumar Rawson Kamal Md. Abu Syem Shah Amanath Ullah***, *Associate Professor, Institute of Health Technology, Rajshahi Medical College, Rajshahi.*

[10] ***Dr. Farhana Yasmin***, *Lecturer, Department of Community Medicine, Rajshahi Medical College, Rajshgahi.*

Correspondence: ***Dr. Md. Jawadul Haque***, *Phone: +880 1730406553 E-mail: mjhaque59@yahoo.comcom*

INTRODUCTION:

Diabetes mellitus appears to be a global epidemic & increasingly becoming a major non-communicable disease threatening both affluent and non-affluent society. More than 170 million people worldwide have diabetes, and this figure is projected to more than double by the year 2030, if the current trends continue further.[1] For diabetic patients hypoglycemia is a fact of life.[2] There is now compelling evidence from the Diabetes Control and Complications Trial (DCCT), that good glycemic control delays the development and progression of retinopathy, neuropathy and nephropathy in IDDM (Insulin- dependent Diabetes Mellitus). However, maintenance of strict glycemic control may sometimes lead to hypoglycemia.[3] Approximately 90% of all patients who receive insulin have experienced hypoglycemic episodes sometimes in their lives. The reported incidence of hypoglycemia varies considerably among studies; however in general patients with type 1 diabetes have an average of two episodes of sympotomatic hypoglycemia per week and one episode of severe hypoglycemia once a year. An estimated 2-4% death of this population have been attributed to hypoglycemia.[4] These findings undoubtedly provide further impetus to patients and health care providers to attempt to maintain plasma glucose levels as close to the non-diabetics range as possible.

A cross–sectional study done on 20 outpatients having type 1 diabetes for at least 10 years revealed that hypoglycemia negatively affected their interpersonal relationship.[5] A prospective observational study was conducted among 344 patients with type 2 diabetes mellitus to assess the risk factors for hypoglycemic episodes. Electronically recorded self-monitored blood glucose results were collected during 12 months of routine monitoring. Over half (51.2%) of the subjects documented at least one hypoglycemic reading for a total of 1662 episodes; They attributed that hypoglycemia occurred due to missing a meal (53.3%) orexercise (23.8%). The study also showed that a high proportion of stable, insulin-treated subjects developed hypoglycemic episode.[6] A prospective study conducted in Philadelphia on hypoglycemia in hospitalized diabetic patients receiving antihyperglycemic therapy showed that about 10% of them experienced 484 hypoglycemic episodes. Of these episodes, 72% were in patients receiving only insulin indicating hypoglycemia is common in hospitalized patients taking insulin.[7]

The gravity of the problem demands that the diabetics must be aware about the symptoms of hypoglycemia as well as the corrective measures that should be taken immediately to overcome the crisis. But, a substantial proportion of diabetic patients, for lack of health education, cannot recognize all the symptoms of hypoglycemia (e.g. dizziness, palpitation, sweating, nausea and vomiting, lack of concentration, visual impairment, abdominal discomfort, tremor, intense hunger, speech disabilities) [8-10] and hence their proper management is delayed[11]. For this reason diabetic patients' perception about hypoglycemia needs to be assessed, which demands a formal study. The present study was, therefore, undertaken to assess the knowledge of diabetic patients about symptoms of hypoglycemia and the measures to be taken to overcome those symptoms.

METHODS:

This descriptive cross-sectional study was carried out in the Department of Community Medicine Rajshahi Medical College, Rajshahi over a period of 2 months from April 2018 to May 2018. During the period a total of the 1001 adult respondents from Puthia Upazila Rajshahi were interviewed for assessing the prevalence of non-communicable diseases (diabetes, hypertension) among them; of them 107(10.7%) were found diabetic (diagnosed by registered physicians or diabetic centers), 246(24.6%) were hypertensive, and the rest 648(64.7%) were free from either conditions. These 107 diabetic patients (sample for the present study) were selected as respondents for studying their demographic variables, control measures for diabetes, knowledge related variables about symptoms of hypoglycemia, opinion about measures to be taken when symptoms of hypoglycemia develop and practice of the respondents when symptoms of hypoglycemia manifested etc. Data were collected on by a structured questionnaire with the help of face to face interview with the respondents. A list of symptoms was presented to the respondents and were asked to encircle those symptoms that were manifested during episodes that they interpret as representing hypoglycemia. The list of symptoms in the questionnaire was based on previous

work that were used to provide validation of the correct allocation of symptoms to either autonomic or neuroglycopenic groups.[12,13] The key variables of interest were operationalized. Hypoglycemia was defined as a condition, which occurs when one's blood glucose level is lower than normal, usually less than 63 mg/dl. Or 3.5 mmol/l.[14] Diabetes referred to individuals suffering from hyperglycaemia (fasting blood glucose level > 126 mg/dl or random blood glucose level >200 mg/dl) resulting from defects in insulin secretion, insulin action, or both.[14] Knowledge, in the present study, meant for having familiarity with symptoms of hypoglycaemia. It refereed to the correct response of diabetic patients to the knowledge questionnaire about hypoglycaemia and its management.

The level of knowledge of the respondents about hypoglycemia was measured using Likert Scale Score. Score '1' was assigned for each correct answer and score '0' for each wrong answer. As there were more than one question in assessing respondents' level of knowledge, combined scores were used to measure respondents' perception about the topic. As stated the levels of knowledge were measured on a 0 – 4 Likert Scale, where 0 meant 'very poor knowledge' and 4 meant 'Excellent knowledge' with 'poor' 1, 'average' 2, and 'good' 3 in between them. First the level of knowledge was assessed separately for responses against each question. Then all these knowledge-related scores were added together to find an overall level of knowledge. As there were 10 knowledge-related questions with highest obtainable score being '10', we divided the scores obtained from the respondents, on a 0 – 4 Likert scale, into five categories: 1) Very poor or grossly dissatisfactory – when 0 – 2 responses were correct, 2) Poor– from 3 – 4 responses were correct, 3) Average – from 5 – 6 responses were correct, 4) Good – from 7 – 8 responses were correct and 5) Excellent – from 9 – 10 responses were correct.

Collected data were processed and analyzed with the help of software SPSS (Statistical Package for Social Sciences) version 17.0. Statistical analyses were done using descriptive statistics. The data presented in categorical scale were expressed as frequency and corresponding percentage, while the data presented on continuous scale were expressed as mean, median and standard deviation from the mean. The summarized data were presented in the form of table and charts with due statistical interpretation.

RESULTS:

Age distribution shows that over one-third (36.4%) of the respondents was middle aged (40-50 years old), 29% upper middle-aged (50-60 years old), 18.7% < 40 years and 6.5% > 70 years old. The mean age was 51.3 years and the youngest and the oldest patients were 30 and 93 years old respectively. Approximately 55% were male with male to female ratio being roughly 11:9 (Table I). Majority (90.7%) of the respondents was married. In terms of occupation, 14% were service-holder, 38.3% were housewife, 15% farmer, 29.9% businessman (Table I). The average monthly income of the respondents was Taka 15537 (range: Taka 2000-40000). More than 40% were primary level educated followed by illiterate (24.3%), SSC (17.8%), HSC (10.3%) and graduate plus (4.7%). Two-thirds (67.3%) of the respondents were of normal BMI, 24.3% were overweight and 6.5% were obese (Fig. 1).

Table I: Distribution of patients by their demographic characteristics (n = 107)

Demographic characteristics	Frequency	Percentage	Mean ± SD
Age* (years) (30 – 93)			51.3 ± 11.7
<40	20	18.7	--
40 – 50	39	36.4	--
50 – 60	31	29.0	--
60 – 70	10	9.3	--
>70	7	6.5	--
Sex			
Male	59	55	--
Female	48	45	--
Marital status			
Married	97	90.7	--
Unmarried	4	3.7	--
Divorced/widow	6	5.6	--
Occupation			
Service	15	14.0	--
Housewife	41	38.3	--
Farmer	16	15.0	--
Business	32	29.9	--
Others	3	2.8	--
Income (Taka)			15537±9158 (2000-40000)
Education			
Illiterate	26	24.3	--
Primary	45	42.1	--
SSC	19	17.7	--
HSC	11	10.3	--
Graduate plus	6	5.6	--

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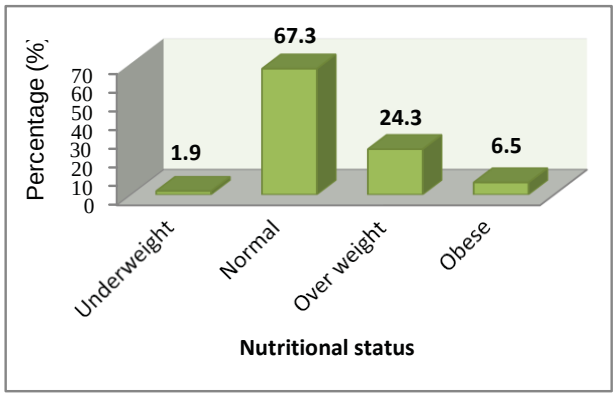

Fig. 1: Distribution of respondents by their nutritional status (n = 107)

Majority (93.7%) of the respondents was suffering from Type-II diabetes. The average duration of diabetes was 6 years and the shortest and longest durations were 1 and 25 years respectively (Table II). As measures of controlling diabetes, most (86%) of the respondents adopted diet control, 68.2% were used to using exercise. Over 70% were taking oral hypoglycemic agent & 27.1% insulin as antidiabetic therapy. Majority (83.2%) was complia to treatment

of diabetes. Approximately 58% of the respondents had control over diabetes (Table III). The respondents' knowledge about symptoms of hypoglycemia are illustrated in table IV. Nausea and vomiting were mentioned by more than half (55.1%) of the respondents followed by abdominal discomfort (49.5%), slurring of speech (31.8%), lack of concentration (30.8%), blurring of vision (22.4%), intense hunger (21.5%), tremor of hands and feet (20.6%), palpitation (19.6%), sweating (16.8%) and dizziness the least (6.5%). Asked about the causes of hypoglycemia, around one-third told missed meal (34.6%), over exercise (33.6%) and overdose of insulin or oral hypoglycemic agent (35.5%). About one-quarter (23.4%) mentioned inadequate food intake and 13.1% told delay in taking food (Table V). As respondents were asked what could be done if symptoms of hypoglycaemia occur, over one-quarter (26.2%) told blood sugar to be measured, 17.8% were in favour of taking light meal or snacks, 15% added to seek medical advice and 9.3% told sugar to be ingested (Table VI). Out of total respondents, only 15(14%) ever admitted in the hospital for hypoglycaemic episode. Of them 9(60%) experienced one episode of hypoglycaemia, 3(20%) 2-episodes, 2(13.3%) 3-episodes and only 1(6/7%) 5-episodes (Table VII). Respondents stratified by their opinion about hypoglycaemia and importance of correction of hypoglycaemia are shown in Table VIII. Respondents' level of knowledge about symptoms of hypoglydcemia was categorised based on Likert scale as described earlier in the 'Methodology' section. Accordingly over half (49.5%) of the respondents had very poor level of knowledge, over one-third (34.6%) had poor knowledge, 13.1% had average knowledge and only 2.8% had good knowledge about symptoms of hypoglydcemia. None had excellent level of knowledge (Table IX).

Table II. Distribution of respondents by diabetic-related profile (n = 107)

Diabetes related profile	Frequency	Percentage	Mean ± SD
Type of diabetes			
Type I	7	6.5	--
Type II	100	93.5	--
Duration of Diabetes	--	--	6.0 ± 4.6 (1-25)

Table III. Respondents' distribution by diabetes control measure taken

Diabetes control measures taken	Frequency	Percentage
Diet control	92	86.0
Regular exercise	73	68.2
Oral hypoglycemic agent	75	70.1
Insulin	29	27.1
Reported compliance to treatnent		
Compliant	89	83.2
Non-compliant	18	16.8
Diabetes under control		
Yes	62	57.9
17	15.9	
28	26.2	

Table IV. Respondents' knowledge about symptoms of hypoglycemia (n = 107)

Symptoms of hypoglycaemia	Frequency	Percentage
Dizziness		
Yes	7	6.5
No / Don't know	96/4	89.7/3.7
Palpitation		
Yes	21	19.6
No / Don't know	73/13	68.2/12.1
Sweating		
Yes	18	16.8
No / Don't know	77/12	72.0/11.2
Nausea & vomiting		
Yes	59	55.1
No / Don't know	37/11	34.6/10.3
Lack of concentration		
Yes	33	30.8
No / Don't know	43/31	40.2/29.0
Blurring of vision		
Yes	24	22.4
No / Don't know	73/10	68.2/9.3
Abdominal discomfort		
Yes	53	49.5
No / Don't know	35/19	32.7/17.8
Tremor		
Yes	22	20.6
No / Don't know	75/10	70.1/9.3
Intense hunger		
Yes	23	21.5
No / Don't know	77/7	72.0/6.5
Slurring of speech		
Yes	34	31.8
No / Don't know	51/22	47.7/20.6

Table V. Respondents' perception about causes of hypoglycaemia (n = 107)

Causes of hypoglycaemia	Frequency	Percentage
Inadequate food intake		
Yes	25	23.4
No/Don't know	50/32	46.7/29.9
Delay in taking food		
Yes	14	13.1
No / Don't know	59/34	55.1/31.8
Missed meal		
Yes	37	34.6
No / Don't know	35/35	32.7/32.7
Over exercise		
Yes	36	33.6
No / Don't know	22/49	20.6/45.8
Overdose of insulin or OHA		
Yes	38	35.5
No / Don't know	16/53	15.0/49.5

Table VI. Knowledge about measures to be taken if symptoms of hypoglycemia occur

Measures to be taken	Frequency	Percentage
Sugar ingestion /Intake of CHO		
Yes	10	9.3
No / Don't know	68/29	63.6/27.1
Light meal / Snacks intake		
Yes	19	17.8
No / Don't know	61/27	57.0/25.2
Measure blood sugar		
Yes	28	26.2
No / Don't know	39/40	36.4/37.4
Seek medical advice		
Yes	16	15.0
No / Don't know	68/23	63.6/21.5

Table VII. Distribution by hypoglycaemic episode related variables

Hypoglycaemic episode related variables	Frequency	Percentage
Ever admitted to hospital for hypoglycaemia		
Yes	15	14.0
No	92	86.0
How many times did that happen (n=15)		
1	9	60.0
2	3	20.0
3	2	13.3
5	1	6.7

Table VIII. Distribution respondents by opinion about hypoglycaemic and glycaemic control

Opinion	Frequency	Percentage
Perception of the symptoms of hypoglycemia		
Nothing serious	25	23.4
It may happen, but should be prevented	44	41.1
Very serious, it should never happen	29	27.1
Life-threatening emergency	9	8.4
Importance of correction of hypoglycaemia		
Not important	7	6.5
Important but not so emergency	17	15.9
Very important	74	69.2
Urgent and life-saving measure	9	8.4

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Table IX. Respondents' level of knowledge about hypoglycemia (n=107)

Level of knowledge (Likert scale)	Frequency	Percentage score)
Very poor (0 – 2)	53	49.5
Poor (3 – 4)	37	34.6
Average (5 – 6)	14	13.1
Good (7 – 8)	03	2.8
Excellent (9 – 10)	00	0.0

DISCUSSION:

In the present study nearly two-thirds (65.4%) of the diabetics were middle-aged and nearly 60% were primary or secondary level educated. Majority (93.7%) of the respondents was suffering from Type-II diabetes. El-zubier[15] demonstrated that majority of subjects in their sample was beyond middle aged, of low level of literacy, and suffering from type 2 diabetes mellitus. The findings of the present study revealed that half (49.5%) of the diabetics had very poor knowledge about symptoms of hypoglycemia, one-third (34.6%) poor knowledge, 13.1% had average level of knowledge. Only 2.8% had good knowledge with none having excellent knowledge. Consistent with these findings, El-zubier's[15] study revealed that only half of the diabetic subjects can recognize a few symptoms of hypoglycaemia.

The low level of perception about hypoglycaemia is common, even among medical staff[16] and it reflects on the quality of care offered to diabetic patients. These findings can be partially explained by the fact that the major proportion of the sample is composed of subjects with low educational status. But equally important would be the problem of lack of health education and doctor-patient communication gap.[17] Studies have shown that problem of inadequate knowledge about symptoms of hypoglycaemia is not uncommon as is found in Saudi Arabia[18] as well as elsewhere in the world.[19,9] Apart from directly leading to death, one of the indirect hazards of hypoglycaemia is that it may endanger the life of a diabetic patient, particularly if it occurs during a risky activity like motor car driving.[20] Hypoglycaemia may cause many symptoms like dizziness, palpitation, sweating, nausea and vomiting, lack of concentration, loss of consciousness, abdominal

discomfort, and intense hunger. In the present study the symptoms that are answered correctly by around 25% (average) of the patients were sweating, lack of concentration, slurring of speech & tremor which are lower from those found in other studies.[17,21] Hypoglycaemic episodes pose both acute and chronic risks. Transient hypoglycaemia can cause various acute cognitive-motor deficits[22,24], which in turn can lead to industrial and automobile accidents & fear & embarrassment.[24,25] Chronic cognitive-motor impairments have previously been reported after frequent severe hypoglycaemic episodes.[26-28] It is, therefore, imperative that patients recognize hypoglycaemia early so that immediate corrective action can be taken. The importance of strict glycemic control to limit the risk of diabetic vascular complications is indisputable, but many barriers obstruct its attainment. Hypoglycemia is recognized to be a major limitation in achieving good control.

Subjective recognition of the symptoms of hypoglycaemia is fundamental to its effective self-management and to prevent its progression in severity.[29] Symptoms are generated when arterial blood glucose concentrations is around 2.8–3.2 mmol/l (50–58 mg/dl) and in young adults have been classified as neuroglycopenic, autonomic, & malaise.[13] Hypoglycaemic symptoms are idiosyncratic and age specific.[44] Recognition of low blood glucose is possible both through self-monitoring of blood glucose (SMBG) and detection of hypoglycaemic symptoms. SMBG is not a completely satisfactory method because it is performed too infrequently to recognize the rapid development of many hypoglycaemic episodes. The cognitive motor impairments associated with hypoglycaemia also may interfere with the accurate performance of SMBG.[28]

The present study, like any other scientific studies was not without limitations. The following

limitations deserve mention:

1. The selection of study population was not based on stringent criteria. As type1 diabetics under insulin therapy are more prone to develop hypoglycaemia, inclusion of type1 diabetics alone could have better reflected perception of the diabetic patients about hypoglycaemia.
2. The study was done in a conveniently selected rural area, which may not reflect the actual situation of the entire rural areas in Bangladesh.

CONCLUSIO N:

The study concluded that over two-thirds of the diabetic patients of Puthia Upazilla take measures to control diabetes and their compliance to treatment is also appreciably high and proportion of controlled diabeticsis no less. But their knowledge about common symptoms and causes of hypoglycemia is poor (no more than 25% on an average). The knowledge about measures to be taken to correct hypoglycemia is even poor (no more than 20% on an average). The level of perception about symptoms of hypoglycemia and the importance of their correction are disappointingly low. As one in every seven patients suffered at least one episode of hypoglycemia since then they are suffering from diabetes, it highlights the importance of health education for diabetic subjects in order to make them able to recognize the symptoms of hypoglycemia and deal with it in an effective way.

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Ibrahim Cardiac Hospital & Research Institute

Life-style of Rural Secondary School Children in Bangladesh with Particular Emphasis to Physical Exercise and Diet

Md. Nurul Amin,[1] Md. Jawadul Haque,[2] Md. Entekhab-Ul-Alam,[3] Shathi Kumar Rawson Kamal Md. Abu Syem Shah Amanath Ullah,[4] Nelofar Yasmin,[5] Farhana Yasmin,[6] Asadur Rahman,[7] Shubhra Prakash Paul,[8] Kowsarunahhar, [9] Anamica Adhikary,[10] Jannatul Ferdous,[11] Afsana Ali [12]

ABSTRAC T

Background & objective: With rapid improvement of socioeconomic condition of developing countries in the last two decades, a rapid change in the nutritional behaviour and activity of adolescents is evident leading to increased prevalence of overweight and obesity among them. The present cross-sectional survey was undertaken to evaluate the dietary and exercise behavior of the adolescents studying in rural secondary schools.

Methods: This study was conducted in the Department of Community Medicine, Rajshahi Medical College, Rajshahi from April-May 2019. Data were collected from secondary schools of Puthia. A total of 535 students from two secondary schools participated in the study. In order to ensure an equal representation from both sexes we chose one boys' and one girls' schools. Every alternate students of those schools from class VI-X were then included in study as respondents. Weight and height of the selected students were first taken followed by interview.

Result: In the present study 15% of the secondary school children were found underweight and 18% were overweight or obese. About 65% of the of the respondents' family were more or less financially solvent. Fifty percent of the adolescents reported that they were accustomed to a healthy balanced diet with 45% reportedly taking fruits and 60% taking plenty of vegetables every day. But only 17.3% took 3 or more servings of fruits a day (the minimum recommended fruit intake). Thirty percent of the adolescents were used to having high carbohydrate and fat. In terms of exercise practice, two-thirds (67.3%) of the students had healthy practice. The predominantly practiced exercise was running (65%) followed by cycling (64.4%), playing cricket (63.6%), football (57.2%) and fast walking (52.2%). However, with respect to number of days of exercise in a week and duration of exercise each day a sizable portion of the students' practice was not considered an ideal one. The respondents who did not practice any kinds of exercise or sports activities, most frequently mentioned their 'preoccupation with coaching or private tutors' (79.4%) as reasons of inactivity, followed by non-encouragement about playing by their parents (71.4%) and teachers (65.5%). Nearly 60% were interested to play but they did not have any playing field nearby home. Nearly one-third of the students pass > 1 hour of their leisure time by watching TV or sitting at computer or playing games or other activities on mobile. Opinion-seeking questionnaire revealed that 20-50% of the respondents had misconception on healthy diet, food, energy-rich food, balanced diet and their ability to make a healthy choice for food in any one of these food & diet-related issues. Boys are more likely to be obese and underweight than the girls.

Conclusion: Unhealthy dietary behavior is widespread among secondary school adolescents in rural area. About one-third of the rural secondary school children are physically inactive and predominant reasons of their inactivity are preoccupation with coaching center or private tutors or no incentive for playing from the parents or teachers. The knowledge level of the students on healthy diet and food is not up to the desired level to make healthy choices for food themselves. Both unhealthy dietary behavior & inactivity might have contributed to inappreciably adverse nutritional status of the secondary level school children.

Key words: Life-style, School Children, Physical Exercise, nutritional status adolescents, diet etc.

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Authors' information:

[1] ***Dr. Md. Nurul Amin***, *Assistant Professor, Department of Community Medicine, Rajshahi Medical College, Rajshahi & Executive Editor, Ibrahim Cardiac Medical Journal, Ibrahim Cardiac Hospital & Research Institute, Shahbag, Dhaka.*

[2] ***Dr. Md. Jawadul Haque***, *Professor & Head, Department Community Medicine, Rajshahi Medical College, Rajshahi, Bangladesh.*

[3] ***Dr. Md. Entekhab-Ul-Alam***, *MBBS, DPH (DU), Assistant Professor, Department of Community Medicine, Rajshahi Medical College, Rajshgahi.*

[4] ***Dr. Shathi Kumar Rawson Kamal Md. Abu Syem Shah Amanath Ullah***, *Associate Professor, Institute of Health Technology, Rajshahi Medical College, Rajshahi.*

[5] ***Dr. Nelofar Yasmin***, *Lecturer, Department of Community Medicine, Rajshahi Medical College, Rajshgahi.*

[6] ***Dr. Farhana Yasmin***,*Lecturer, Department of Community Medicine, Rajshahi Medical College, Rajshgahi.*

[7] ***Dr. Asadur Rahman***, *Lecturer, Department of Community Medicine, Rajshahi Medical College, Rajshgahi.*

[8] ***Dr. Shubhra Prakash Paul***, *Lecturer, Department of Community Medicine, Rajshahi Medical College, Rajshgahi.*

[9] ***Dr. Kowsarunahhar***, *MBBS, MPH Course (BSMMU), Rajshahi Medical College, Rajshahi*

[10] ***Dr. Anamica Adhikary***, *MBBS, MPH Course (BSMMU), Rajshahi Medical College, Rajshahi*

[11] ***Dr. Jannatul Ferdous***, *MBBS, MPH Course (BSMMU), Rajshahi Medical College, Rajshahi*

[12] ***Dr. Afsana Ali***, *MBBS, MPH Course (BSMMU), Rajshahi Medical College, Rajshahi*

Correspondence: *Dr. Md. Nurul Amin, Mobile: 01753178452, e-mail: mdamin01@yahoo.com*

INTRODUCTION:

The World Health Organization (WHO) recognized obesity as a global epidemic in 1997.[1] In the past 30 years, the prevalence of obesity has doubled in children and quadrupled among adolescents.[2] Worldwide 43 million children were overweight/obese in 2010, of which 35 million children are from developing countries. In addition, 92 million were found at risk of having overweight and obesity.[3] Studies done in developed countries revealed that the prevalence of overweight/obesity among school children is increasing.[4-6] Establishing eating patterns and physical activity in adolescence can result in dietary habits that continue through adulthood. The WHO Global Strategy on diet, physical activity and health[7] highlights that bringing about changes in dietary habits and patterns of physical activity will require the combined efforts of many stakeholders, public and private. Nutrition is one of the important elements for healthy living in school-aged children and it should be given high priority on every school agenda. There is evidence to suggest that improved nutrition enhances learning ability, leading to better academic performance.[8] The school, therefore, has the responsibility to promote healthy eating patterns whilst acknowledging that improving the nutrition starts of school-aged children is an important investment for future generation. Research shows that school environment influences children attitude, preferences, & behaviors. Therefore, it is becoming an issue of increasing interest to study the adolescents' nutritional status and eating patterns and exercise.

Physical education and physical activity have an educational value in their own right and provide the child with a more holistic education. There is strong evidence that children and adolescents benefit from physical activity through improved cardiorespiratory & muscular fitness from, bone health, cardiovascular and metabolic health biomarkers. There is growing body of evidence that inactive children are more likely to become inactive adults[9] Hence, the importance of introducing physical activity at an early age can help improve academic achievement, including grades and standardized test scores. Physical activity can affect cognitive skills and attitudes and academic behaviour. Increasing or maintaining time dedicated to physical education might help and does not appear to adversely affect academic performances.[10] Childhood & adolescents are critical periods and the provision of a healthy diet at this stage reduces the risk of diet-related health conditions including obesity and oral health issues.

In Bangladesh childhood obesity is becoming a growing public health problem not only in the urban areas but also in the rural areas. These days inactivity among children & adolescents have become pandemic. The wave of widespread inactivity coupled with unhealthy dietary behaviour has added an impetus to the non-communicable diseases. Shaping healthy life-style practice should be initiated during the period of childhood and adolescence. But lack of knowledge of physical activity guidelines for children & negativity towards physical education at school among adolescents, potentially hinders healthy living. Multiple factors may influence the eating and exercise behaviour of the adolescents. That purpose the present study was undertaken to evaluate perception and practice of rural secondary school children about physical exercise and dietary habits of rural secondary schools in Bangladesh as well as factors that govern their dietary and exercise behaviour.

METHODS:

This cross-sectional analytical study was carried out in the two secondary schools of Puthia, namely Pthia Girls' High School and P.N. Govt. High School, Puthia, over a period 1 month from April-May 2019. Adolescents (age between 11-18 years or studying at grade VI-X) of the defined secondary schools were the study population. Of them who voluntarily consented (verbal consent) through the School Authority (Headmaster) to participate in the study were included as sample. Students having known chronic diseases like valvular heart diseases or any other systemic diseases that may affect their nutritional status and students remaining absent on the day of interview and students who refused to participate in the study were excluded.

A total of 540 students from two schools (one boys' and one girls' school) were primarily included in the

study. Of the 540 students five students were from primary schools and hence were excluded leaving 535 students for final analysis. On obtaining permission from the school authority & verbal consent from the students, the data were collected from the respondents by face-to-face interview. Demographic characteristics (age, sex & socioeconomic status) including height, weight and grade in the school of all respondents were assessed first. Height was measured without shoes to the nearest centimeter using a ruler attached to the wall, while weight was measured to the nearest 0.1 kg on a manually-adjusted scale with the subject wearing school dress and no shoes. Using weight and height data, body mass index (BMI) was calculated with help of formula BMI = (weight in kg)/(height in sq-meter). Nutritional status was determined based on body mass index. As BMI of children and adolescents is age- and sex-specific, calculated BMI was plotted on Growth-chart [developed and recommended by Centre for Disease Control, Atlanta] to find the percentile (Fig.1). Then the nutritional status of the individual respondents was determined as shown in table I:

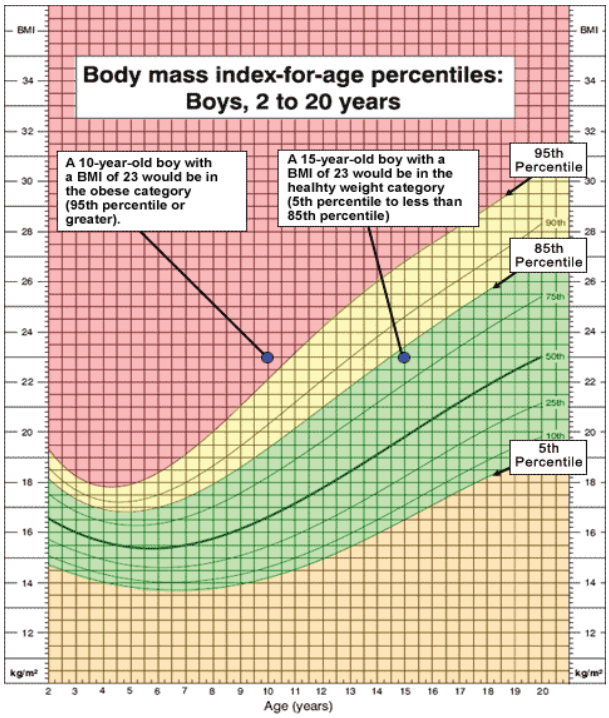

Fig. 1 : Body mass index-for-age percentiles (Adapted

BMI for Children and Teens

- Age- and sex-specific
- Plot BMI on growth chart to find percentile
- Weight status determined by percentile

Weight Status Category	*Weight Status Category*
Obese	≥ 95th percentile
Overweight	85th to < 95th percentile
Normal	5th to < 85th percentile
Underweight	< 5th percentile

Fig. 2 : Nutritional status based on BMI-for-age percentiles (Adapted from CDC, Atlanta)

Then data were collected on eating habits, physical activity & lifestyle, healthy and unhealthy dietary habit & food, The pastime (ways of passing leisure time) adopted by the students, reasons of reluctance to take exercise and nutrition knowledge. The following terms were operationalized for uniform and objective evaluation of the students' dietary and exercise behavior.

Unhealthy dietary behavior: When the dietary practice of the participating students were found deviated from that recommended by the Food Guide Pyramid.

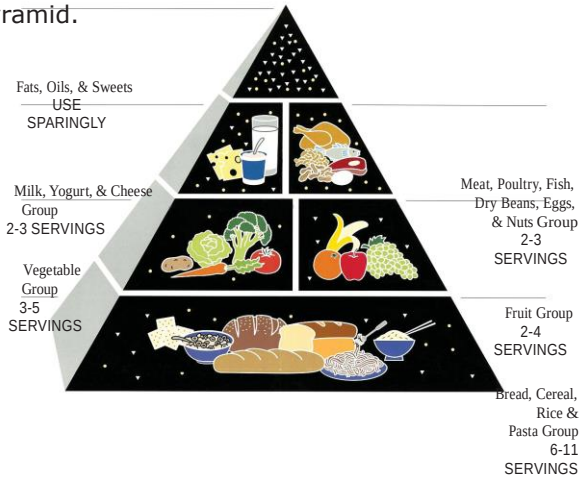

Fig. 3 : Food Guide Pyramid (Source: TH Chan, School of Public Health – Harvard University)

Healthy dietary behavior: When the dietary behaviour of the students conforms with that recommended by the Food Guide Pyramid.

from
CDC, Atlanta)

Inactivity: When the students do not practice any outdoor games or take formal exercise at least 5

days in week with at least 30 minutes duration in each day.

Healthy exercise behaviour: When the students used to practice any outdoor games or take formal exercise at least 5 days in a week with 30 minutes duration in each day, the exercise behaviour was considered normal or healthy

Data processing and analysis were done using SPSS (statistical package for social sciences), version 25.0. The test statistics used to analyze the data were descriptive statistics and Chi-square (χ^2) Test. The level of significance was set at 5% and p-value < 0.05 was considered significant.

RESULTS:

Age distribution shows that nearly half of the students were 13-14 years old, 32.1% 11-12 years, 19.1% 15-16 years and only 1.5% 17-18 years old. The mean age of the respondents was 13.3 ± 1.4 years. Gender distribution shows that girls outnumbered boys by 11: 9 with 54.8% girls and 45.2% boys (Table I). Over half of the respondents belonged to middle class family, 29% lower middle class, 10.7% upper middle class, 6.5% poor and 3.6% rich (Fig.1). Nutritional status was measured in terms of BMI for specific age and sex. Accordingly two-thirds (66.7%) of the students were of normal BMI (Healthy), 15.1% underweight, 9.2% overweight and another 9% were obese (Fig. 2).

Table I. Distribution of students by their demographic characteristics (n=535)

Demographic characteristics	Frequency	Percentage
Age* (years)		
11-12	172	32.1
13-14	153	47.3
15-16	102	19.1
17-18	8	1.5
Sex		
Boys	293	54.8
Girls	242	45.2

*Mean age = 13.3 ± 1.4 years; range = (11–18) years; median = 13.0 years; mode = 13.0 years

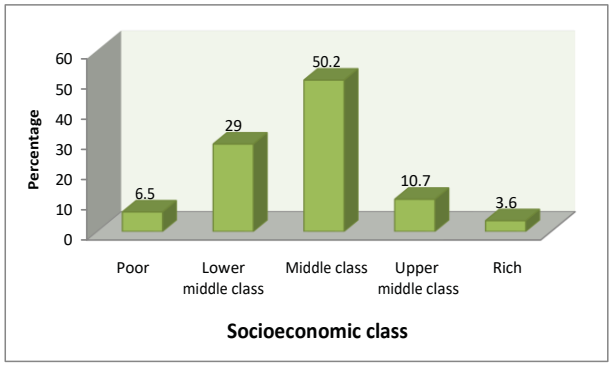

Fig. 1: Distribution of respondents by their social class

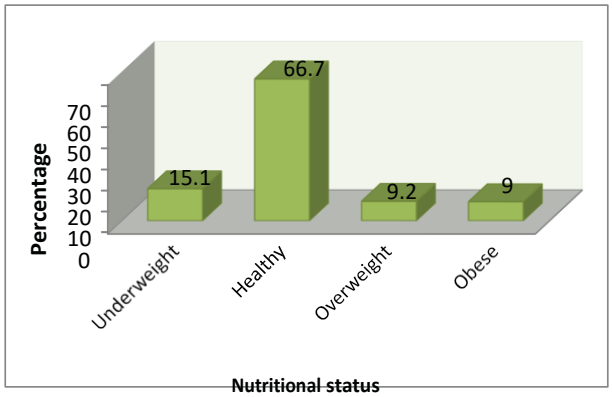

Fig 2: Distribution of students by their nutritional status (n = 535)

Data pertaining to dietary behavior of the students are shown in Table II. Majority (85%) of the students informed that they always take breakfast, 7.9% take it often, 6% take it sometimes and 1.1% never takes breakfast. Of the total students, 243(45.4%) told that they take fruits every day. Sixty percent of the students used to take vegetables every day. Nearly half (49.2%) of the students told that their major meal was based on a balanced mixes of carbohydrate, protein and fat, while 27.3% of the students' major meal was predominantly composed of carbohydrate, 20.2% predominantly of protein and 3.4% predominantly of fat. Two-thirds (66%) of the students used to take biscuits or breads or crackers as their light meals (snacks), 17% take fruits or milk or yoghurt, 12.1% sweet, ice-cream or chocolate and only a few have had their light with Burger/Soft-drink/Pizza/Fried-chicken/Grill. Majority (82.7%) of the students who take fruits everyday (n = 243) takes them 1-2 times a day, 14.8% 3-4 servings a day and only 2.5% 5 or more servings a day (Fig. 3).

Out of 535 respondents, 360(67.3%) informed that they took exercise regularly. Types of exercise/sports practiced by the students are illustrated in Fig. 4. The predominant form of exercise practiced by them was running (65%) followed by cycling (64.4%), cricket (63.6%), football (57.2%), fast walking (52.2%). Other less commonly practiced forms of exercise were outdoor games (41.9%), jogging (30.8%) and formal exercises (18.9%) (Fig. 4). Those who took exercise regularly, 247(68.6%) of them were used having exercise 5-7 days in a week and the rest 113(31.4%) < 5 days a week. Nearly 90% of them used to take exercise 30 minutes or more a day. Watching TV was the main way of pastime (85.2%) followed by listening music (80%), reading a book (72%), playing games or other activities on mobile (58.9%), shopping (52.5%), gardening (51.6%) and using a computer (Fig. 5). Over two-thirds (67.9%) of the respondents spent 1 or < 1 hour on watching TV/computer/mobile etc. Those respondents who did take any kinds of exercise (n = 175) were asked to mention the reasons of reluctance to take exercise. The predominant reason reported by the students was going to coaching or private tutor (79.4%), parents do not encourage playing (71.4%), school/ teachers do not encourage playing (65.5%), no playing field nearby home (58.9%), no leisure time to play (30.3%) and no playing field in the school (7.9%) (Table III).

Asked about what a healthy diet comprised of, over 60% respondents told diet rich in different foods, 23.2% told diet rich in protein, 13.3% opined diet rich in carbohydrate and only 1.9% told diet rich in fat. As opinion about a healthy diet was sought, out of a number of choices, approximately 85% of the respondents told fresh food, 8.4% told processed food and 7.3% told foods without preservative and additives. Opinion sought from the respondents about what an energy-rich food is meant for, over them half (52.5%) of then opined protein, 31.2% told carbohydrate and 16.3% meant fat. Asked about whether the respondents themselves were able to make healthy choices for food, 363 (67.9%) nodded that they could do so. Opinion sought about what a balanced diet constitutes, more than 80% of the respondents told that a diet containing all the nutrients in proportionate amount comprised a balanced diet (Table IV). Girls were healthier (68.9%) than their boys counterpart (64%). Both obesity and underweight were more prevalent among boys than those among girls, although the difference did not turn to significant (p = 0.233) (Table V).

Table II. Distribution of students by their dietary behavior (n = 535)

Dietary behavior of the respondents	Frequency	Percentage
Take Breakfast		
Always	455	85.0
Often	42	7.9
Sometimes	32	6.0
Never	6	1.1
Eat fruits everyday	243	45.4
Take plenty of vegetables everyday	321	60.0
Major meals based on		
High protein	108	20.2
High fat	18	3.4
High carbohydrate	146	27.3
Balanced of mixed diet	263	49.2
Snacks mainly based on		
Fruits/Milk/Yogurt	91	17.0
Biscuits/crackers/bread	353	66.0
Burger/Soft-drink/Pizza/ Fried-chicken/Grill	22	4.1
Sweet/Ice-cream/Chocolate	68	12.7

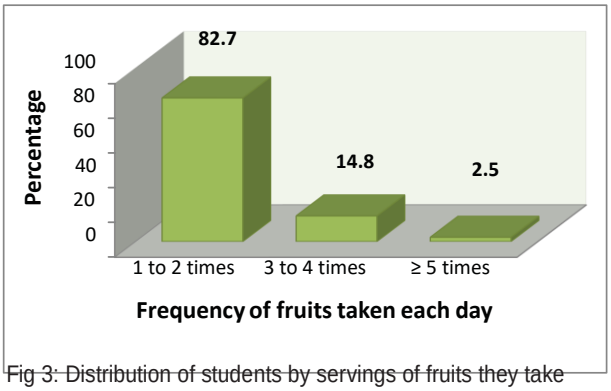

Fig 3: Distribution of students by servings of fruits they take each day (n = 243)

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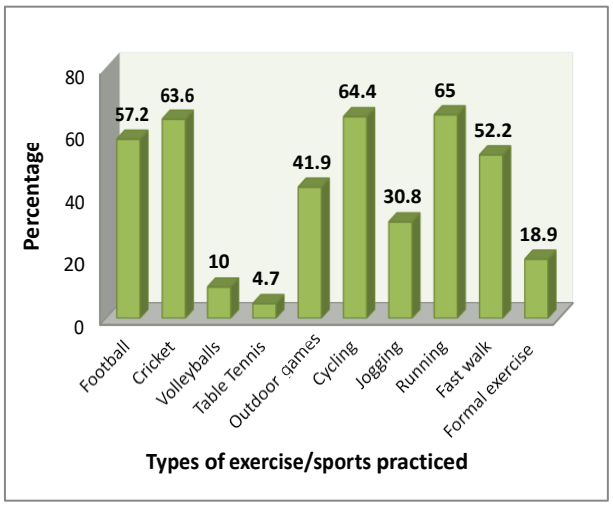

Fig 4: Students stratified by types of exercise/sports practiced by the them (n = 360)

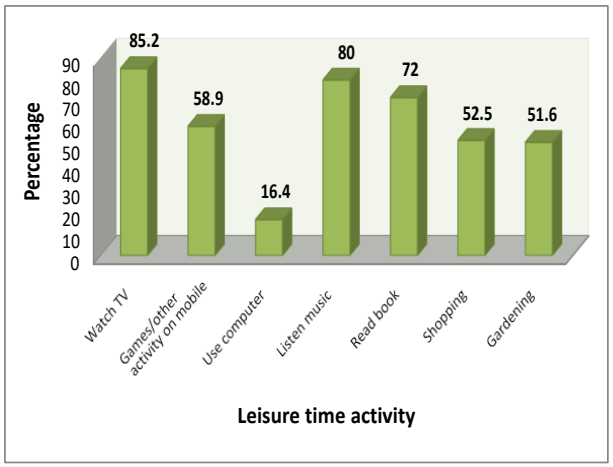

Fig 5: Distribution of students by their leisure time activities (n = 535)

Table III. Reasons of not taking any kinds of exercise (n = 175*)

Reasons	Frequency	Percentage
No leisure time to play	53	30.3
Go coaching or private tutor	139	79.4
No playing field in the school	17	9.7
No playing field nearby home	103	58.9
School/teachers do not encourage to play	115	65.5
Parents do not encourage playing	125	71.4

*Total will not correspond to 100% for multiple response

Tab IV. Students stratified by their opinion about a healthy diet, food, balanced diet (n=535)

Opinion	Frequency	Percentage
Which of the following dietshealthy diets		
Diet rich in different foods	330	61.7
Diet rich in protein	124	23.2
Diet rich in carbohydrate	71	13.3
Diet rich in fat	10	1.9
Which of the following foods are healthy food		
Fresh food	451	84.3
Processed food	45	8.4
Foods without preservatives and additives	39	7.3
Which of the following foods are energy-rich food		
Protein	281	52.5
Carbohydrate	167	31.2
Fat	87	16.3
Which of the following diets is a balanced diet		
Diet rich in protein	66	12.3
Diet poor in fat	12	2.2
Diet poor in carbohydrate	20	3.7
All the nutrients in proportionate amounts	437	81.7

Table V. Association between sex and nutritional stats

Nutritional status (based on BMI)	Sex		p-value
	Boys (n = 242)	Girls (n = 293)	
Healthy (5th - < 85th percentile)	155(64.0)	202(68.9)	
Overweight (85th - < 95th percentile)	19(7.9)	30(10.2)	0.233
Obese (≥ 95th percentile)	26(10.7)	22(7.5)	
Underweight (< 5th percentile)	42(17.4)	39(13.3)	

Figures in the parentheses denote corresponding percentage.
Data were analyzed using Chi-square (χ^2) Test

DISCUSSION:

In the present study 15% of the secondary school children were found underweight and 18% were overweight or obese. Finding underweight adolescents in a rural area is not unusual, but if overweight and obese adolescents exceed the

underweight ones, it is really a cause of concern. About 65% of the of the respondents' family were more or less economically solvent (belonging to middle class, upper middle class and rich). Once underweight was a problem among adolescents living in rural areas of Bangladesh and overweight and obesity was rarely reported. With the improvement of economic status, nutritional status has changed a lot. Now underweight is gradually decreasing with consequent increase in the incidence of overweight and obesity and the country is experiencing a double burden of malnutrition. This pattern of change in nutritional status (rising of overweight/obesity epidemics) is the characteristics of all developing countries and is attributed by rapid economic and epidemiologic transition, caused by several socioeconomic and demographic changes that reflects the profound changes in the society.[11-14] Numerous obesity-related co-morbidities can develop during childhood, which include cardiovascular risk factors such as hypertension, insulin resistance and hyperlipidaemia, even in very young children and conditions such as sleep apnoea, asthma, liver disease, and type 2 diabetes mellitus. Evidence also shows that childhood obesity can track into adulthood, & is therefore associated with an increased risk of ill-health later in life.[15] The data of changing nutritional status in the present study, thus is indicative of increased prevalence of non-communicable diseases in the future and leaves scope for health authority and school authority to simultaneously address the issue. Exposing children to balanced nutrition throughout childhood reinforces lifelong eating habits thus contributing to children's overall well-being and helping them enjoy a healthy and fulfilling life in the future.

As dietary behavior of the adolescents was analyzed, 50% of the adolescents reported that they were accustomed to a healthy balanced diet with 45% reportedly taking fruits every day and 60% taking plenty of vegetables every day. But further probing revealed that out of 45% who reported taking fruits every day, only 17.3% took 3 or more servings of fruits a day. As "Food-guide Pyramid" recommends 2-4 servings of fruits to maintain a balanced diet, 82.7% of the adolescents in the present study cannot be considered maintaining a balanced diet in terms fruits intake. In terms of intake of vegetables, 40% of the adolescents' daily diet does not contain enough vegetables, which might have unfavorably affected their health. Thirty percent of the adolescents were used to having high carbohydrate and fat which might have contributed to the development of overweight and obesity. In terms of exercise practice, two-thirds (67.3%) of the students had healthy practice. The predominantly practiced exercise was running (65%) followed by cycling (64.4%), cricket (63.6%), football (57.2%), fast walking (52.2%). However, with respect to number of days of exercise in a week and duration of exercise each day a sizable portion of the students' practice cannot be considered an ideal one.

The respondents who did not practice any exercise or sports activities were asked to mention the reasons behind their unhealthy behavior. The most frequently mentioned reason was 'preoccupation with coaching or private tutors' (79.4%), followed by non-encouragement of playing by their parents (71.4%) and teachers (65.5%). Nearly 60% of the respondents were interested to play but they did not have any playing field nearby home or inside the school to play. These days as a result of urbanization, priority is shifting to using space for new buildings, condominiums (which represent a dramatic shift in housing), roads, and car parks instead of children's recreational and play areas.[16] The school environment clearly affects the level of physical activity and overweight/obesity of in-school adolescents, since they spend the majority of their time in schools.[17] Thus, the nutritional status of the adolescents as depicted in the present study is not only due to negligence of health authority. The education authority is equally liable for their unwanted nutritional status. Finding a sustainable solution to this problem lies in the combined and coordinated action of both Health and Education Ministries.

Once playing was considered as a part of education and almost every student used to play in the school-field. Playing outdoor games not only helps to build health, it immensely contributes to moral and social development as well. As the sole purpose of education was to build character, playing was considered indispensable for attaining the purpose of

education. When education was begun to be viewed as a lucrative, profit-making business by the teachers or by some vested quarters, the coaching-centers began to flourish with rote-learning and model-question solving by the students became the priority activities. The learning became coaching-center dependent & students were bound to invest their leisure-time in coaching centers instead of playing in the field. The resulting physical inactivity led them to be overweight and obese. So the deep-rooted cause of this problem lies in the reorientation of our education system with playing being considered as part and parcel for attaining the educational goal. There is pressing need for nutrition education to extend down to secondary school children.

Another concern raised from the findings of the study is that one-third of the students pass > 1 hour of their leisure time by watching TV or sitting at computer or playing games or other activities on mobile. This newer addiction of young generations is harmful in many respects. It not only leads to inactivity with consequent accumulation of risk factors of non-communicable diseases, it also adversely affects the mental and social health of the users.

Finally, opinion-seeking questionnaire revealed the level of knowledge of the respondents about food and diet. There were altogether five questions which helped determine their perception on healthy diet, food, energy-rich food, balanced diet and their ability to make a healthy choice for food. The responses gathered on these variables revealed that 20-50% of the respondents had misconception in any one of these food and diet-related issues. In this arena, the health authority has wider scope to work and it is their undeniable responsibility to fill in this gap. Had the health authority launched a mass behavior change communication among the school-level children and adolescents, an unprecedented healthy dietary & exercise behavior could have been resulted.

CONCLUSION:

From the findings of the study, it can be concluded that every 1 in 6 secondary school children in rural area suffers from underweight, while every 1 in 5 children suffers from overweight or obesity. Unhealthy dietary behavior, either in terms of balanced diet or in terms of protective food, is rampantly prevailing among secondary school adolescents in rural area. About one-third of the rural secondary school children are physically inactive and reasons of being inactive are predominantly 1) going to coaching center or private tutors, 2) no incentive for playing from the parents or teachers. Even, those who intend to play, they cannot do it, because of absence of a plying field nearer to their home or in the school. Besides, their knowledge level on healthy diet and food is not up to the desired level to make healthy choices for themselves. Both unhealthy dietary behavior and inactivity might have contributed to inappreciably adverse nutritional status of the secondary level school children.

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Evaluation of Cardiac Remodeling After Surgical Closure of Atrial Septal Defect in Different Age Groups

SMG Saklayen[1], Laila Akter Zahan [2], Jubayer Ahmad [3], Mohammad Armane Wadud [4], Tarana Fariah Monalisa [5], Rezwanul Hoque [6], Ibrahim Khalilullah[7]

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ABSTRAC T

Background & objective: Cardiac remodeling manifested clinically as changes in size, shape and function of the heart. The extent of remodeling depends on initial morphological changes. So the time at which the surgical correction of atrial septal defect (ASD) done is important. Apparently surgical outcome and remodeling is better at earlier age in comparison to adult age. The aim of this study was to find whether surgical correction of ASD is beneficial at younger age (up to 18 years) in comparison to adult age (above 18 years).

Methods: This prospective cohort study was carried out on a total of 70 patients who underwent surgical closure of atrial septal defect over a period of twenty three months (23) months (from February 2013 to December 2014) in the Department of Cardiac Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka. The recruited patients were divided into two groups – Group-A (comprised of ≤ 18 years old patients) and Group-B (comprised of >18 years old patients) 35 patients in each. Condition of the heart was evaluated preoperatively by echocardiography and the result was compared with postoperative echocardiographic findings at follow-ups after 1 and 3 months after surgery.

Results: The comparison of echocardiographic parameters between baseline (preoperative) and those at 1 and 3 months after surgery in Group-A demonstrated that statistically significant remodeling occurred after 1st month ($p < 0.001$) and it further improved at 3 months. In Group-B the comparison of echo parameters between baseline and at 1 month revealed that all the parameters responded significantly indicating that remodeling occurred well after 1 month. But the same parameters when compared between baseline and at months after repair revealed insignificant differences in all the parameters, except PWT indicating that remodeling that occurred at month 1 regressed at 3 months interval. Cardiac remodeling occurred in both groups, but the degree of remodeling between patients of early age (Group-A) and late age (Group-B) revealed that ASD repair at early age responded well with respect to all the echocardiographic variables of remodeling.

Conclusion: Cardiac remodeling occurs after surgical closure of atrial septal defect. But the degree of remodeling is better if the closure is done at earlier age (at or below 18 years).

Key words: Atrial Septal Defect, Cardiac Remodeling, Surgical Closure, Age etc.

Authors' information:

[1] ***Dr. SMG Saklayen***, *Assistant Professor and Associate Consultant, Department of Vascular Surgery, Ibrahim Cardiac Hospital and Research Institute*

[2] ***Dr. Laila Akter Zahan***, *Registrar and Specialist, Department of Vascular Surgery, Ibrahim Cardiac Hospital and Research Institute*

[3] ***Dr. Jubayer Ahmad***, *Assistant Professor and Associate Consultant, Department of Vascular Surgery, Ibrahim Cardiac Hospital and Research Institute*

[4] ***Dr. Mohammad Armane Wadud***, *Assistant Professor and Associate Consultant, Department of Cardiac Surgery, Ibrahim Cardiac Hospital and Research Institute*

[5] ***Dr. Tarana Fariah Monalisa***, *Bangladesh Civil Service (Health), OSD, Director General Health*

[6] ***Dr. Rezwanul Hoque***, *Professor and Chairman, Department of Cardiac Surgery, Bangabandhu Sheikh Mujib Medical University*

[7] ***Dr. Ibrahim Khalilullah***, *Registrar and Specialist, Department of Cardiac Anesthesiology, Ibrahim Cardiac Hospital and Research Institute*

Correspondence: ***Dr. SMG Saklayen***, *Phone: 01552344915, email: saklayendmc@gmail.com*

INTRODUCTIO N:

An Atrial Septal Defect (ASD) represents a communication between the left and right atrium leading to left to right shunt. It makes up about 10% of all congenital heart diseases after delivery and up to 30–40% of heart defects diagnosed in patients aged over 40 years.[1] The progression of this congenital defect to congestive cardiac failure follows the onset of pulmonary hypertension, arrhythmias, respiratory infections, and other cardiovascular disease. Hence, the defect is usually discovered when a patient presents with dyspnoea or palpitations or occasionally on routine medical examination.[2] About 75% of adult patients with atrial septal defect show signs or symptoms of the disease in the third or fourth decade of life. Closure of most atrial septal defects is still the treatment of choice in children & young adults, because of the low surgical risk and good long-term outcome. Surgical management of atrial septal defect became a clinical reality in the 1940s. However, the beneficial result of closure in adults over 40 years of age remains controversial, primarily because, incomplete information exists regarding the natural history and the variables associated with survival beyond this age.[3]

Cardiac remodeling may be defined as genome expression, molecular, cellular and interstitial changes that are manifested clinically as changes in size, shape and function of the heart after cardiac injury. The myocyte is the major cardiac cell involved in the remodeling process. Other components involved are interstitium, fibroblasts, collagen and coronary vasculature. Relevant processes include in the remodeling are ischemia, cell necrosis & apoptosis.[4] Pathologic remodeling may occur with pressure overload (e.g., aortic stenosis, hypertension), volume overload (e.g., atrial septal defect, valvular regurgitation), or following cardiac injury (e.g., myocardial infarction). In each of these settings, remodeling may reveal transition from an apparently compensatory process to a maladaptive one.[2]

Measures to assess LV remodeling include heart size, shape and mass, ejection fraction, end-diastolic and end-systolic volumes and peak force of contraction. Although direct measurement of the size and shape of the heart might appear to be the most logical method of assessing the extent of remodeling, technical factors and differences of interpretation lead to variation in the results. For example, only 38% of hypertensive patients with anatomic LV hypertrophy showed LV hypertrophy when assessed on M-mode echocardiography.[4] The extent of cardiac remodeling after surgical correction depends on initial morphological changes attributed to the disease process itself. So the age at which surgical corrections are made have important bearings on the remodeling process itself.

METHOD S:

This prospective cohort study was carried out on a total of 70 patients (ranging from 5 – 50 years) who underwent surgical closure of atrial septal defect over a period of twenty three months (February 2013 to December 2014) in the Department of Cardiac Surgery, Bangabandhu Sheikh Mujib Medical University, Dhaka. Informed written consent was taken from each patient before enrollment. Patients with isolated ASD (Septum primum, Septum secondum, Sinous Venosus type of ASD) were included. However, patients of ASD with associated lesion, systemic disease such as end stage renal disease, hepatic failure, respiratory failure and ASD with Eisenmenger's syndrome were excluded. Detailed history, clinical examination & relevant investigation reports of all patients were recorded on the data-sheet. The patients were divided into two groups – Group-A (comprised of ≤ 18 years old patients) & Group-B (comprised of >18 years old patients) 35 patients in each group. Condition of the heart was evaluated preoperatively by echocardiography and the result was compared with postoperative echocardiographic findings at follow-ups after 1 and 3 months of surgery. The echocardiographic variables used to evaluate the cardiac remodeling (morphological and functional outcome of heart) were LA (Left Atrium), IVST (Interventricular Septal Thickness), PWT (Posterior Wall Thickness), LVIDd (Left Ventricular Internal Diameter at End-Diastole), LVIDs (Left

Ventricular Internal Diameter At End-Systole), EF (Ejection Fraction), FS (Fractional Shortening).

All patients underwent median sternotomy followed by surgical closure of ASD. All statistical analyses were performed using SPSS 22.0 statistical package. While continuous data were expressed as mean ± SD & were compared between groups using Unpaired t-Test, qualitative data presented as frequency (percentage) and were compared between groups using Chi-square (χ^2) Test. All analyses were done at 5% level of significance and p-value < 0.05 was considered significant.

RESULT:

The mean ages of the patients of Group-A and Group-B were 12.1 ± 3.4 and 30.7 ± 6.8 years respectively. Of the 35 patients in Group-A 22(62.9%) were male and 13(37.1%) were female, while in Group-B, out of 35 patients, 18(51.4%) were male and 17(48.6%) female. Majorities of the ASDs in Group-A (71.4%) and Group-B (80%) were septum secondum followed by septum primum and sinous venosus defect. The groups were almost identical in terms of type ASDs (p = 0.700) (Table I).

Table II shows mean diameter of LA, IVST, PWT, LVIDd, LVIDs, EF, FS at preoperative period and at 1 and 3 months following ASD repair. The comparison of these echocardiographic parameters between preoperative findings versus findings at 1 and 3 months revealed that statistically significant remodeling occurred after surgical correction (p < 0.001). In Group-B the comparison between preoperative findings versus findings at 1 month demonstrated that all the parameters responded significantly. But the same parameters when compared between baseline and at 3 months after repair revealed insignificant differences in all the parameters except in PWT (Table III). Table IV shows the mean changes in LA diameter, LVIDd, LVIDs, IVST, PWT, EF, FS from preoperative period to 3 months between Group-A and Group-B. Comparison of degree of remodeling between Group-A and Group-B at 3 months revealed that Group-A responded well in all the variables of remodeling.

Table I. Comparison of type of type of ASDs between the two study groups

Baseline characteristics*	Group		p-value
	Group-A (n = 35)	Group-B (n = 35)	
Sex			
Male		22(62.9)	0.334
18(51.4) Female		13(37.1)	
17(48.6) Types of ASD			
Septum Secondum		25(71.4)	
28(80.0) Septum Primum	6(17.1)	4(11.4)	0.700
Sinous Venosus	4(11.4)	3(8.5)	

Figures in the parentheses denote corresponding percentage. *Data were analyzed using Chi-square (χ^2) Test and were presented as n(%).

Table II. Comparison of echocardiographic findings at preoperative, after 1 month and 3 months of operation in Group-A

Echo Variables	Group-A			Statistical Analysis (p-value)	
	Preoperative	At 1 month	At 3 month	Preoperative vs. at 1 month	Preoperative vs. at 1 month
LA (mm)	30.43±2.59	31.40±2.72	29.20±4.14	<0.001*	0.062ns
IVST (mm)	8.83±1.42	9.89±1.37	8.54±1.74	<0.001*	0.086 ns
PWT (mm)	9.06±1.30	10.26±1.40	8.97±1.25	<0.001*	0.032*
LVIDd (mm)	47.29±2.54	48.46±2.67	46.86±2.83	<0.001*	0.062 ns
LVIDs (mm)	33.20±2.21	34.37±2.21	32.74±2.83	<0.001*	0.081 ns
EF (%)	65.00±3.13	64.14±3.97	65.31±7.12	<0.013*	0.758 ns
FS (%)	29.37±2.12	41.64±4.65	30.17±4.84	<0.001*	0.268 ns

*Data were analyzed using Unpaired t-Test and were presented as mean ± SD.

Table III. Comparison of echocardiographic findings at preoperative, after 1 month and 3 months of operation in Group-B

Echo Variables	Group-B			Statistical Analysis (p-value)	
	Preoperative	At 1 month	At 3 month	Preoperative vs. at 1 month	Preoperative vs. at 1 month
LA (mm)	30.43±2.59	31.40±2.72	29.20±4.14	<0.001*	0.062ns
IVST (mm)	8.83±1.42	9.89±1.37	8.54±1.74	<0.001*	0.086 ns
PWT (mm)	9.06±1.30	10.26±1.40	8.97±1.25	<0.001*	0.032*
LVIDd (mm)	47.29±2.54	48.46±2.67	46.86±2.83	<0.001*	0.062 ns
LVIDs (mm)	33.20±2.21	34.37±2.21	32.74±2.83	<0.001*	0.081 ns
EF (%)	65.00±3.13	64.14±3.97	65.31±7.12	0.013*	0.758 ns
FS (%)	29.37±2.12	41.64±4.65	30.17±4.84	<0.001*	0.268 ns

*Data were analyzed using Unpaired t-Test and were presented as mean ± SD.

Table IV. Comparison of degree of remodeling in two study group at 3 months of follow up (n=70)

Variables	Group		t-value	p-value
	Group-A (n = 35)	Group-B (n = 35)		
LA (mm)	-2.09±0.88	-1.23±2.17	-1.30	0.033*
LVIDd (mm)	-4.20±1.53	-0.43±1.31	-11.07	< 0.001*
LVIDs(mm)	-4.17±1.40	-0.46±1.50	-10.69	< 0.001*
IVST(mm)	-1.97±0.95	-0.29±0.96	-7.38	< 0.001*
PWT(mm)	-1.89±0.96	-0.09±0.28	-10.60	< 0.001*
EF(%)	5.40±2.68	0.31±6.00	4.58	< 0.001*
FS(%)	3.43±1.87	0.80±4.21	3.38	0.001*

Figures in the parentheses denote corresponding percentage.
*Data were analyzed using Chi-square (χ^2) Test and were presented as n(%).

DISCUSSION:

The comparison of echocardiographic parameters between baseline (preoperative) and those at 1 & 3 months after surgery in Group-A demonstrated that statistically significant remodeling occurred after 1st month ($p < 0.001$) & it further improved at 3 months. In Group-B the comparison of echo parameters between baseline and at 1 month revealed that all the parameters responded significantly indicating that remodeling occurred well after 1 month. But the same parameters when compared between baseline and at 3 months after repair revealed insignificant differences in all the parameters, except in PWT indicating that remodeling that occurred at month 1 regressed at 3 months interval.

In a retrospective study, Oliver et al[6] examined the outcome of early and late surgical repair of ASD in adults, as compared with the natural evolution of unoperated patients. Their study population comprised of 280 patients (mean age 40 ± 18 years, with youngest and the oldest patients) with non-restrictive ASD: 102 patients underwent surgery before the age of 25 years, 90 patients underwent surgery after the age of 25 years, and 88 unoperated patients were older than 25 years at the time of study.

In Group-A the mean diameter of left atrium at preoperative period was 28.3 ± 4.0 mm which increased to 35.5 ± 3.3 mm after 1st month and then decreased to 26.2 ± 3.9 mm after 3rd month of postoperative period and in Group-B, the mean diameter of left atrium at preoperative period was 30.4 ± 2.6 mm which increased to 31.4 ± 2.7 mm after 1st month and decreased to 29.2 ± 4.1 mm after 3rd month of postoperative period. LA size increased in the first month probably due to oedema, myocardial ishchaemia and effect of cardiopulmonary bypass. This finding of LA dimension is consistent with finding of Roberts et al[5]. They concluded that there was marked LA enlargement in patients with ASDs, suggesting that in addition to the known volume overload with resultant stretch of the right atrium, there is chronic stretch of the LA. Second, there were structural changes within the LA with loss of functioning myocardium. But according to Oliver et al[6], the size of the left atrium is much smaller in patients who undergo surgery before the age of 25 years than in those who undergo surgery after the age of 25 and in those who do not undergo surgery. The contribution of volume overload to the increase in size of the left atrium does not appear to be important, as those patients who underwent closure of the ASD after the age of 25 years had the same or even greater left atrial size than the patients who did not undergo surgery. In group A, the interventricular septal thickness at preoperative period was 8.5 ± 1.2 mm which increased to 10.4 ± 0.8 mm after 1st month and decreased to 6.5 ± 1.4 mm after 3rd month of postoperative period and in group B, the interventricular septal thickness at preoperative period was 8.8 ± 1.4 mm which increased to 9.9 ± 1.4 mm after 1st month and decreased to 8.5 ± 1.7 mm after 3rd month of postoperative period.

In group A, the posterior wall thickness at preoperative period was 8.11 ± 1.59 mm which increased to 9.6 ± 1.5 mm after 1st month and decreased to 6.2 ± 1.8 mm after 3rd month of postoperative period and in group B, the PWT at baseline was 9.1 ± 1.3 mm which increased to 10.2 ± 1.4 mm after 1st month and decreased to 8.9 ± 1.2 mm 3rd month after repair. The LVIDd at preoperative period was 41.3 ± 3.2 mm which changed to 45.9 ± 3.2 and 37.1 ± 3.6 mm after 1st and 3rd month postoperatively respectively, while the same parameter in Group-B, the LVIDd at preoperative

period was 47.3 ± 2.5 mm which enlarged to 48.4 ± 2.7mm after 1st month and decreased to 46.8 ± 2.8 mm after 3rd month postoperatively. At first month of postoperative period LVIDd probably increased due to postoperative myocardial ishchaemia, and oedematous changes resulting from manipulation of the heart. Komar et al[7] showed that LVIDd reduces insignificantly from baseline value, 49.9 to 47.3 mm at 1st month, 45.9 mm at 6 month. According to Thilén et al[8] the left ventricle increased significantly in size after closure, whether measured as an area or as a dimension (LVIDD). However, closure did not affect left atrial size. Komar et al[7] observed that LVIDs increases from baseline value, 35.4 to 38.5 mm at 1st month and then reduces to 36.5 mm at 6 months with no significant changes from baseline to 6 months.

In group A, the ejection fraction at preoperative period was 62.9 ± 2.6 percent which decreased to 53.4 ±10.9 percent after 1st month and increased to 68.4 ± 3.8 percent after 3rd month postoperatively and in Group-B, the ejection fraction at preoperative period was 65.0 ± 3.1 percent which decreased to 64.1 ± 3.9 percent after 1st month & increased to 65.3 ± 7.1 percent after 3rd month postoperatively. According to Komar et al[7] EF reduces from 60.4% at baseline to 59.4% at 1st month postoperatively but again increases at 6 month postoperatively. The fractional shortening in Group-A at preoperative period was 28.5 ± 1.9 percent which decreased to 22.9 ± 1.9 percent after 1st month and to 31.9 ± 278 percent after 3rd month of repair. The same variable in Group-B, at preoperative period was 29.3 ± 2.1 percent which increased to 41.6 ± 5.6 percent after 1st month and again decreased to 30.2 ± 4.8 percent after 3rd month of postoperative period compared to its preoperative figure.

In group A, the comparison between preoperative findings versus 1 month and preoperative versus 3 months was statistically significant in case of LA, IVST, PWT, LVIDd, LVIDs, EF and FS. In group B, the comparison between preoperative findings versus 1 month was statistically significant in case of LA, IVST, PWT, LVIDd, LVIDs, EF and in FS. But the comparison between preoperative findings versus 3 months was insignificant in case of LA, IVST, LVIDd, LVIDs, EF and in FS. Comparison of degree of remodeling between patients of early age (Group-A) and late age (Group-B) revealed that ASD repair at early age respond well with respect to all the echocardiographic variables of remodeling.

CONCLUSION:

This study observed that cardiac remodeling occurs after surgical closure of atrial septal defect at any age but the degree of remodeling was better patients less than 18 years, compared to that in 18 or more than 18 years old.

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Ibrahim Cardiac Hospital & Research Institute

Impact of Cell-phone on Human Health: A Systematic Review of Literatures

Md. Nurul Amin,[1] Md. Sultan-Ul-Islam,[2] Md. Jawadul Haque [3]

ABSTRAC T

The growth of communication technology in the last two decades has given the world a new look.With the blessings of digital technology, we can now communicate to any parts of the world with just a touch over the screen of our smart phone. Mobile phone hasnow become an indispensable part of our life.But, biological effects of radio-frequency electromagnetic fields (EMF) transmitted by mobile phones are still a matter of public and scientific debate. Countries accross the world are now getting concerned about the impact of mobiles on human health and environment.Radiofrequency waves generated from mobile phones cause potential public health problems. Short-term effects like changes in sleep, heart rate, and blood pressure, and long-term effects like carcinoma (particularly glioma) are well-documented. International Agency for Research on Cancer (IARC) published cancer risks from Radiofrequency(RF) radiation. Human epidemiological studies gave evidence of increased risk for glioma and acoustic neuroma. Further epidemiological, animal and mechanistic studies have strengthened the association. Besides, the carcinogenic effect of non-ionizing radiation emitted from cordless digital devices, numerous health effects have already been claimed to occur. Faced with this context, scientific community and legislative bodies are raising voice for the reduction of RF-EMF exposure to the safe limit for human health and environment. The RF exposure restriction guideline used by many agencies was established in 1998 by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and was based only on established short-term thermal (heating) effects from RF radiation neglecting non-thermal biological effects. The present study is, therefore, intended to review the literatures relating mobile phone and Wi-fito human health in order to make the scientific community updated on the association between mobile phone use and human health.

REVIEW

INTRODUCTIO N:

Last two decades have witnessed tremendous growth in communication technology. With the advent of digital technology, we can now communicate to any parts of the world within a moment. The global mobile phone users were 4.57 billions in 2018, which is expected to reach 4.78 billions in 2020 (https://www. statista.com/statistics/274774/forecast-of-mobile-phone-users-worldwide/). The number of active smartphones across the globe reached 3.3 billion by the end of 2018 (worldwide, about 39 percent of the population).When looking at smartphone owners by age, penetration is highest among aged 18-24 years (98% of whom own smartphones) followed by aged 25-34 years (with a 97% ownership rate), and aged 35-44 years (with a 96% ownership rate), making smartphones nearly ubiquitous among these generational segments (https://www. google.com/ search?source). The total number of Mobile Phone subscribers in Bangladesh has reached 154.18 million at the end of August, 2018 (http://www.btrc.gov. bd/content/mobile-phone-subscribers-bangladesh-august-2018) ranking Bangladesh in 9thposition in the world by number of mobile phones in use (157,048,000). The number of internet users in Bangladesh has crossed the 90.5 million mark, and more than 84.6 million access the worldwide web on mobile phone. According to the study, 94.1 percent households in urban areas and 85.2 percent in rural

Authors' information:

[1] ***Dr. Md. Nurul Amin***, *Assistant Professor, Department of Community Medicine, Rajshahi Medical College, Rajshahi & Executive Editor, Ibrahim Cardiac Medical Journal, Ibrahim Cardiac Hospital & Research Institute, Shahbag, Dhaka.*

[2] ***Dr. Md. Sultan-Ul-Islam***, *Professor & Chairman, Department of Geology Mining, Ex- Director, Institute of Environmental Science, University of Rajshahi, Rajshahi-6205*

[3] ***Dr. Md. Jawadul Haque***, *Professor & Head, Department Community Medicine, Rajshahi Medical College, Rajshahi*

Correspondence: ***Dr. Md. Nurul Amin***, *Mobile: 01753178452, E-mail: mdamin01@yahoo.com*

areas are connected with mobile network. And one in every four women in rural areas is connected with mobile network. Keeping pace with the communication technology, the world's economy is growing faster. Thus, mobile phones have become indispensable as communication tools; however, to date, there is an inadequate knowledge on what biological systems could be affected by the use of these devices. Biological effects of radio-frequency electromagnetic fields (EMF) transmitted by mobile phones are still a matter of public and scientific discussion. Sensations of burning or warmth around the ear,[1] headache[2], disturbance of sleep[3], alteration of cognitive functions and neural activity[4,5,] as well as alteration of the blood-brain barrier and a relative decrease in regional cerebral blood flow have been reported as effects resulting from mobile phone use.[6,7] The potential tumorous effect of EMFs is still a subject of debates & research.[8-11] International Agency for Research on Cancer (IARC) published cancer risks from Radiofrequency (RF) radiation. Human epidemiological studies gave evidence of increased risk for glioma and acoustic neuroma. RF radiation was classified as Group 2B, a possible human carcinogen. Further epidemiological, animal and mechanistic studies have strengthened the association. Besides, the carcinogenic effect of non-ionizing radiation emitted from cordless digital devices, numerous health effects have already been claimed to occur. Animal model study showed that long-term exposure of 2.4 GHz RF emitted from Wi-Fi (2420μW/kg, 1g average) affects some of the reproductive parameters of male rats (head defects of sperms and weight of the epididymis) suggesting that Wi-Fi users should avoid long-term exposure of RF emissions from Wi-Fi equipment.[12]

Individuals sensitive to electromagnetic fields often experience cognitive impairments which they believe are due to exposure to RF. Furthermore, they complaint of headache and perceive that such symptom is caused by the RF EMF exposure.[13] Headache is an important warning sign that body temperature is rising to a risky level suggesting that when RF heats body tissues, body temperature and other vital physiological parameters such as heart rate and blood pressure may change.[14] In spite of this, most countries have taken little or no measure to reduce exposure and educate people on health hazards from RF radiation. On the contrary ambient levels have increased[15-17] causing concern about its impact on human health. With the increasing use of third generation (3G) mobile phones, social concerns have arisen concerning the possible health effects of radio frequency-electromagnetic fields (RF-EMFs) emitted by mobile phones in humans.[18] With new technology, increasing environmental exposure levels are found as in measurements of ambient RF radiation at Stockholm Central Station and Stockholm Old Town in Sweden.[17,19]

The exposure guideline used by many agencies was established in 1998 by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and was based only on established short-term thermal (heating) effects from RF radiation neglecting non-thermal biological effects. The heating effects arise when radiation is so high that it warms up the body by 1°C or more after 30 min exposure at 4 W/kg specific absorption rate.[20] That purpose the present review was aimed at studying the impact of cell phone on human health with particular emphasis to attaining the following objectives.

OBJECTIVES:

- Find the impact of cell phone (duration of mobile use or talk-time)on physical health in terms of changes in haemodynamic state like local temperature, blood pressure, pulse heart rate etc.
- Study the relationship between mobile phone use & stress, sleep disturbances, symptoms of depression among young adults.
- Analyze whether increased incidences of certain brain tumours (like glioma & aucustic neuroma) and thyroid malignancy have link with radiofrequency radiation, emitted from cell-phones and their base-station.
- Find whether the incidence of hearing impairment is increasing with decrease in age incidence of the disease and whether it has any link with mobile use.
- Determine the impact RF emitted from cell-phone and Wi-Fi on fertility of the animal.

REVIEW

- Determine the level of radiofrequency emitted from mobile phones and whether the exposure level is too far that recommended by ICNIRP
- Put forward some recommendations to help concerned authorities or legislative bodiesso as to shed some light on safety of mobile technology and to constantly monitor the RF radiation exposure from the mobile phone, Wi-fi and other digital devices and their base-stations to keep people safe from their harmful effect.

METHODS:

This comprehensive review was made based on the literatures of recent and recent past origin. A systematic search of relevant literatures from MEDLINE, PubMed, PMC, Google Scholar and the Cochrane Systematic Review Database was done to identify experimental, cohort, case-control, quasi-experimental, cross-sectional studies relating mobile phone, Wi-fi device and the RF emitted from them with human health. Animal model experimental studies found available on Net werealso included. The collected literatures were critically reviewed about their strengths and weaknesses considering following points systematically.

1. **Design:** Whether the study was an experimental, longitudinal or cross-sectional one? Randomized controlled trial was ranked highest followed by, cohort, case-control and cross-sectional studies.
2. **Type of study population, sample size and sampling procedure:** Whether the study population was rightly selected for the design contemplated? Whether the size of the sample and sampling procedure was statistically valid to measure what it intended to measure?
3. **Exposure & outcome (disease) definitions:** Whether the exposure and outcome (disease) was defined/operationalised before the start of study? Whether the diagnosis was validated by the latest available diagnostic techniques?
4. **Power of the study:** What was the power of the study? If the power of the study was below 80%, it was considered as a weaker study to generalize the findings of the study to the reference population.
5. **Test statistics used to analyse the data:** Whether appropriate test statistics were employed to analyse the data depending upon the type of data and nature of distribution.
6. **Causal association:** Based on the above criteria if an association was observed between the exposure/factor and outcome, causal association was evaluated by modified Hill's Criteria as follows.

6.1 **Strength of association:** In general, the stronger the association, the lower the likelihood that the results are attributable to chance.

6.2 **Consistency of association:** If similar results are found in different studies conducted in different populations, it provides strong evidence for or against causal inference.

6.3 **Specificity of association:** Finding a single event associated with the factor in question provides more suggestive evidence of a causal association than if multiple unrelated events are found.

6.4 **Temporal association:** A causal association is more strongly suggested if the events of interest are clustered in time after the exposure than if the events are distributed over a longer and more varied time interval.

6.5 **Biologic gradient:** The presence of a dose-response effect of drug or toxin or radiation provides increased evidence of causal association.

6.6 **Biological plausibility:** If the event of interest is consistent with known effects of the factor in question, the evidence of causal association is strengthened.

6.7 **Coherence:** The evidence should fit together into a reasonable explanation for the observed association between the exposure and the event of interest.

6.8 **Experimental evidence:** Intervention studies that test a hypothesis can provide evidence for or against causal inference.

In general, the evidence related to benefit or harm of specific interventions is derived from multiple

sources. These include: epidemiological observational studies which identify associations; clinical research and large-scale randomized clinical trials to establish efficacy, net benefit and cost-effectiveness; randomized clinical trials to establish safety and outcomes research and long-term surveillance data to allow an estimate of outcomes and effectiveness in clinical practice.

LITERATURES REVIEWED:

Radiofrequency emissions & physical symptoms:

Because of the quick development and widespread use of mobile phones, and their vast effect on communication and interactions in work and private life, it is important to study possible negative health effects of the exposure to electromagnetic fields (EMF). The number of people with self-reported electromagnetic hypersensitivity (EHS), who complain of various subjective symptoms such as headache, dizziness and fatigue, has increased during the last couple of decades. However, the origins of EHS remain unclear. Cross-sectional survey studies in different countries have reported that EHS subjects experience non-specific subjective symptoms (e.g., headache, dizziness, fatigue, sleep disorder) associated with EMF exposure: 1.5% in Sweden,[21] 3.2% in California[22] and 5% in Switzerland.[23] For some individuals, the symptoms can have lifestyle-changing consequences.[24] Self-reported symptoms associated with using of mobile phones most commonly include headaches, earache, & warmth sensations,[25,26] and sometimes also perceived concentration difficulties & fatigue.[25] However, EMF exposure due to mobile phone use is not currently known to have any major health effects.[27] Musculoskeletal symptoms due to intensive texting on a mobile phone have also been reported[28] and techniques used for text entering have been studied in connection with developing musculoskeletal symptoms.[29]

Schoeni and colleagues[30] conducted a prospective cohort study to see whether memory performance in adolescents is affected by radiofrequency electromagnetic fields (RF-EMF) from wireless device use or by the wireless device use itself due to non-radiation related factors in that context. Verbal and figural memory tasks at baseline and after one year were completed using a standardized, computerized cognitive test battery. Use of wireless devices was inquired by questionnaire and operator-recorded mobile phone use data was obtained for a subgroup of 234 adolescents. RF-EMF dose measures considering various factors affecting RF-EMF exposure were computed for the brain and the whole body. Data were analyzed using a longitudinal approach, to investigate whether cumulative exposure over one year was related to changes in memory performance. All analyses were adjusted for relevant confounders. The study concluded that a change in memory performance over one year is negatively associated with cumulative duration of wireless phone use and more strongly with RF-EMF dose. This may indicate that RF-EMF exposure affects memory performance.

The HERMES (Health Effects Related to Mobile phonE use in adolescents) study conducted on 439 Swiss adolescents (aged 12-17 years) to prospectively investigate whether exposure to radiofrequency electromagnetic fields (RF-EMF) emitted by mobilephones and other wireless communication devices is related to behavioural problems or concentration capacity in adolescents. Behavioural problems were assessed using the Strengths and Difficulties Questionnaire (SDQ), concentration capacity of the adolescents was measured by means of a standardized computerized cognitive test named FAKT. Cross-sectional & longitudinal (1year of follow-up) analyses were performed to investigate possible associations between behavioural problems and concentration capacity and different exposure measures: self-reported and operator-recorded wireless communication device use, cumulative RF-EMF brain and whole body dose and measured personal RF-EMF exposure. In the cross-sectional analyses behavioural problems were associated with several self-reported wireless device use measures but not operator-recorded mobile phone use measures, concentration capacity was associated with several self-reported and operator- recorded exposures. The longitudinal analyses point towards absence of associations. The lack of consistent exposure-response patterns in the longitudinal analyses suggests that behavioural problems &

concentration capacity are not affected by the use of wireless communication devices or RF-EMF exposure. Information bias and reverse causality are likely explanations for the observed cross-sectional findings.[31]

Radiofrequency emissions and cancer risk:

There has been a growing concern about the possible carcinogenic effects of the electromagnetic radiofrequency fields emitted from mobile phones. Evidences from the INTERPHONE study, a multicenter case-control study and the largest investigation so far of mobile phone use and brain tumors including glioma, acoustic neuroma, and meningiomas, & other similar studies have proved to be inconclusive in this regard.[32] However, epidemiological studies provided supportive evidence of increased risk for head and brain tumours, i.e., acoustic neuroma and glioma. RF radiation from devices that emit non-ionizing RF radiation in the frequency range 30 kHz-300 GHz, is a Group 2B, i.e. a 'possible', human carcinogen.[33,34] Later studies have corroborated these findings and have thus strengthened the evidence.[35,36] For children this risk may be accentuated because of a cumulative effect during a long lifetime use. Developing and immature cells can also be more sensitive to exposure to RF radiation.[37] An animal model study report was released from NTP under the National Institute of Health (NIH) in USA (the largest ever animal study on cell phone RF radiation and cancer).[38] An increased incidence of glioma in the brain and malignant schwannoma in the heart was found in rats. Acoustic neuroma or vestibular schwannoma is a similar type of tumour as the one found in the heart, although benign. This animal study supported human epidemiological findings on RF radiation and brain tumour risk.[36] Lack of data of human exposure and mobile use over time periods longer than 15 years warrants further research to explore the linkage of cancer risk & its use beyond 15 years from the first exposure, especially among younger people, i.e., children and adolescents, who have a potentially longer lifetime of exposure.[39,40]

Radiofrequency emissions and fertility:

An animal model study was carried out to investigate long-term effects of radiofrequency radiation (RFR) emitted from a Wireless Fidelity (Wi-Fi) system on testes.[41] The study was carried out on 16 Wistar Albino adult male rats by dividing them into two groups such as control (n = 8) and exposure (n = 8). Rats in the exposure group were exposed to 2.4GHz RFR radiation for 24h/d during 12 months (1 year). The same procedure was applied to the rats in the control group except the Wi-Fi system was turned off. The study demonstrated increased abnormal morphology (head defects) of the sperms in the exposure group compared to the control group ($p<0.05$) while weight of the epididymis and seminal vesicles, seminiferous tubules diameter and tunica albuginea thickness were decreased in the exposure group ($p<0.01$, $p<0.001$, $p<0.0001$).

Radiofrequency emissions and mental and behavioral problems:

Mental health problems have been increasing among young people around the world.[42] Cultural and social changes in terms of increased materialism and individualism have been discussed in relation to this,[43,44] including the possibility of a decreasing stigma about mental illness, improved screening for mental illness, and increased help-seeking behaviors.[45] Although numerous studies have examined the effects of Global System for Mobile Communications (GSM) on humans between EHS (electromagnetic hypersensitivity) and non-EHS groups, only a few provocation studies involving wideband code division multiple access (WCDMA) have simultaneously evaluated physiological changes, subjective symptoms, and EMF perception. Furubayashi et al[46] measured psychological and cognitive parameters during pre- and post-exposure. They also monitored physiological parameters, such as skin temperature, heart rate and local blood flow, and asked participants (EHS and non-EHS women) to report on their subjective perception of EMF emitted by WCDMA devices. They concluded that EHS and non-EHS groups did not differ in their responses to real or control EMF exposure with respect to any psychological, cognitive, or autonomic parameters. Mobile phone addiction is comparable to compulsive gambling and video gaming, having both physical and psychological withdrawal symptoms when they stop using it, like anxiety, restlessness, nervousness, and

irritability, which disappear when they start using the phone again. The neurophysiological basis for this addiction cannot be ruled out as the role of electromagnetic radiation on the neurotransmitters and the postsynaptic receptors is yet to be explored.[47]

Exposure to radio-frequency & haemodynamic effect:

Malek and associates[48] in an experimental study on 200 subjects demonstrated that there is no significant effect of short-term GSM (Global System for Mobile Communication) and UMTS (Universal Mobile Telecommunications System) on body temperature and blood pressure indicating that body temperature and blood pressure are not affected by short term GSM and UMTS. On the other hand, for the heart rate, there is a statistically significant difference between the pre- and post-exposure sessions, ($p<0.05$). The heart rate of subjects clearly decreases over the course of the exposure, on average, about 3 beats per minute.

Since cellphones emit radiofrequency electromagnetic fields (EMFs), Umar and associates[49] tested the hypothesis that cellphones placed near the heart might interfere with the electrical rhythm of the heart or affect the blood pressure. Following informed consent, 18 randomly selected apparently healthy male volunteers (mean age 21.44 ± 0.53 years) had their blood pressure, pulse rates and ECG measured before and after acute exposure to a cell phone. The ECG parameters obtained were: heart rate (HR), QRS complex duration (QRS), PR interval (PR) and Corrected QT interval (QTc). The blood pressure and pulse rates before and after exposure to the cell phone showed no significant difference. The ECG parameters (HR, QRS duration, PR interval and QTc respectively) did not differ before, during and after calls compared to baseline suggesting that acute exposure to EMFs from cellphones placed near the heart may not interfere with the electrical activity of the heart or blood pressure in healthy individuals; however as the sample size was too small, caution should be exercised to generalize the findings to reference population. It is still believed that the existence of RF-EMF exposure effects from the mobile phones, Wi-fi and their base stations have not been rigorously tested to show their adverse consequences with scientific certainty.

Mobile phone use and hearing impairment:

There is only a limited knowledge about interaction between electromagnetic fields (EMF) emitted by mobile phones and auditory function. The hearing system is in the closest proximity to the device so that hearing is potentially the most affected target of thermal and non-thermal effects. Moreover, the hearing system and particularly the cochlear outer hair cells (OHC) are known to be highly sensitive to a great variety of exogenous and endogenous agents and externally applied electric and magnetic fields are known to be able to produce some hearing sensation.[50] Despite all these considerations and evidences, only recently, some studies have analyzed the effects of mobile phones on the auditory system.[51,52] However, the results are not completely consistent.

The animal experiments using distortion product otoacoustic emissions (DPOAEs) did not show statistically significant changes on the OHC functionality of adult and developing rats exposed as long as 30 days 1–2 h per day to EMF at 900 MHz and 1800 MHz frequencies.[53,54] No measurable change in evoked otoacoustic emissions (OAEs) was detected and none of the subjects reported a deterioration in hearing threshold level after 10-min exposure to the EMFs emitted by mobile phones in a recent human study on possible effects of the EMF of mobile telephones on hearing.[55] Other studies based on the auditory brainstem response and middle latency response methods concluded that 30 min mobile phone use has no short-term adverse effects on the human auditory system.[56,57] The small amount of publications shows that there is a big gap in the knowledge of potential biological effects of cellular phone use on hearing.

Impact of mobile phone on children:

Due to the closer proximity of the mobile phone to the brain of children compared to adults, the average RF exposure from its use is higher by a factor of 2 in a child's brain and by a factor of 10 in the bone marrow of the skull. Brain and bone marrow have a higher conductivity in children than in adults and receive a higher energy deposition from RF sources. With age, the bone marrow progressively incorporates more fat,

and the bone itself increases in thickness, hardens, and loses water over time, thus making the tissues less vulnerable.[34] Adolescents belong to the heaviest users of wireless communication devices, but little is known about their personal exposure to radiofrequency electromagnetic fields (RF-EMF). A study was conducted to describe personal RF-EMF exposure of Swiss adolescents and evaluate exposure relevant factors. Furthermore, personal measurements were used to estimate average contributions of various sources to the total absorbed RF-EMF dose of the brain and the whole body. A total of 90 adolescents (aged 13 to 17 years) participated in the study conducted over a period of one year. Personal exposure was measured using a portable RF-EMF measurement device (ExpoM-RF) measuring 13 frequency bands ranging from 470 to 3600 MHz. The participants carried the device for three consecutive days and kept a time-activity diary. In addition, personal measurement values were combined with dose calculations for the use of wireless communication devices to quantify the contribution of various RF-EMF sources to the daily RF-EMF dose of adolescents. The result obtained showed that RF-EMF exposure of adolescents is dominated by their own mobile phone use (67.2%). Environmental sources such as mobile phone base stations play a minor role (19.8%). WLAN at school and at home had little impact on the personal measurements (WLAN accounted for 3.5% of total personal measurements). According to the dose calculations, exposure from environmental sources (broadcast transmitters, mobile phone base stations, cordless phone base stations, WLAN access points, and mobile phones in the surroundings) contributed on average 6.0% to the brain dose and 9.0% to the whole-body dose.[58] Although WHO has concluded that current scientific evidence does not justify specific measures for children, nevertheless, steps to reduce RF exposure, i.e., reduce the amount of time spent on the mobile phone and use speaker mode or a headset to place it at a distance from the head, can be applied to children and teenagers as well.[59]

Other effects:

The use of mobile phones by students at places and situations where its use should be restricted is quite common, as studied by Subba et al., which ranged from 17.9% usage while driving to 95.5% while in classrooms.[60] Mahmoodabad et al.[61] reported 84% usage among medical students in classrooms and 18.6% during driving."Ringxiety" (phantom ringing) resulting in hampering of studies was experienced by 34.5% of the students who mostly used their phones at classrooms (99%) and libraries (60.3%).[60]

DISCUSSION:

Mobile phone has become a part and parcel of our life. We cannot do even a single day without a mobile. But how much we are aware what deleterious effect it produces on our health and environment. Despite being the best instrument, for better communication, there has always been counter arguments & research over the increasing use of mobile phones and its short-term and long-term health effects. Mobile phones are low-powered radiofrequency (RF) transmitters, with frequencies between 450 and 2700 MHz, operating through a network of base stations, with power in the range of 0.1-2 W transmitted through an antenna used close to the user's head.[39] It uses RF fields in the form of electromagnetic waves which are transmitted from the handset to the closest base station to connect calls, text messages, emails, pictures, and web downloads to the main telephone network.[62] Thus, human exposure to RF radiation can occur from a variety of sources, including the use of personal devices (mobile phones, cordless phones, Wi-Fi, Bluetooth etc.), occupational & environmental sources (broadcast antennas, high- power pulsed radars etc.).[34] The RF part of the electromagnetic field (EMF) is that part of the spectrum with frequencies in the range of 3 kHz to 300 GHz which is not sufficient enough to cause molecular level ionization & hence is a type of "non-ionizing radiation". It only results in tissue heating with a negligible rise in body temperature, often referred to as "thermal" effects.[63] However, the carcinogenic potential of EMF, changes in the permeability of the blood-brain barrier, electroencephalographic activity, and changes in blood pressure have been reported.[64] Short-term effects like changes in sleep, heart rate, and blood pressure headache, earache, & warmth sensation, concentration difficulties, and fatigue have been highlighted by numerous studies,[65] while long-term

effects like carcinomaare well-documented.[36,36] Hence, given the immense number of mobile phone users, even a small increase in the incidence of adverse effects on health can have major public health implications. To know how health hazards could be caused from RF exposure, it is essential to know the mechanism of action of RF in biological tissue.

Mechanism of action of RF in biological tissue:

Tissue heating is the principal mechanism of interaction between RF energy and the human body. At the frequencies used by mobile phones, most of the energy is absorbed by the skin and other superficial tissues, resulting in negligible temperature rise in the brain or in any other organs of the body and, thus, they do not pose any proven health hazards. However, much of public health concern revolves around the possibility of hazards from long-term exposure to levels which do not produce measurable heating.[59] Effects on brain electrical activity, cognitive function, sleep, heart rate, and blood pressure in volunteers have also been investigated, as well as for self-reported symptoms, but consistent evidence of adverse effects from exposure to RF field at levels below which those causing tissue heating is lacking.[40,64]

In the meantime, the World Health Organization (WHO) and government agencies like Federal Communications Commission (FCC) of the United States have laid down specific limits for human exposure to RF emissions from hand-held mobile phones in terms of specific absorption rate (SAR), a measure of the rate of absorption of RF energy by the body.[62,63] The FCC's exposure guidelines demarcate an SAR of 1.6 W/kg, averaged over 1 g of tissue, as the safe limit for a mobile phone user and every handset should comply with this limit before FCC approval is granted for marketing of a phone in the United States. However, less restrictive limits, e.g., 2 W/kg averaged over 10 g of tissue, are specified by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) guidelines, endorsed by WHO, and used in Europe and most other countries.[63] WHO recommends that these standards are protective of all persons; nevertheless, if individuals are concerned about avoiding even potential risks, they can take a few simple steps to minimize their exposure to RF energy.[59]

Exposure of a user to RF falls off rapidly with increasing distance from the handset. A person using a mobile phone 30-40 cm away from the body, i.e., using speaker mode while talking or using a "hands free" device, e.g., bluetooth headsets, will, therefore, have a much lower exposure than someone holding the handset against the head.[64] A mobile phone usually operates on the lowest power necessary to maintain call quality.[59] Although various devices which claim to increase the safety of mobile phone use, e.g., shielded cases, earpiece pads/shields, antenna clips/caps, special batteries, and absorbing buttons, reduce exposures by a factor of 10, they have the danger of adversely affecting the phone's antenna, due to which the phone will attempt to transmit more power up to its specified maximum.[34,59] Till date, scientific evidence does not indicate any need for shields on mobile phones, and therefore, such add-on devices should be judiciously used.[59] Using the phone in areas of good reception also decreases exposure as it allows the phone to transmit at reduced power.[59,64] Since time is a key factor in how much exposure a person receives, reducing the time spent on usage by limiting the number and length of calls may reduce RF exposure.[59,63] Revolutionary changes in mobile phone technology have lowered the RF power emissions from the newer devices like the third-generation (3G) phones where it is two times lowered and Digital Enhanced Cordless Telecommunications (DECT) where the risk is almost five times lowered than the older versions.[34]

When mobile phones are used very close to certain medical devices including pacemakers (within about 8 inches), implantable defibrillators, and certain hearing aids, they may malfunction due to their susceptibility to electromagnetic signals.[63] The risk is much reduced for 3G phones and newer devices.[66] Hence, to avoid this potential problem, pacemaker patients can avoid placing a phone in a pocket close to the location of their pacemaker.[63]

Basis for limiting exposure according to ICNIRP:

The evidences gleaned from the studies discussed so far, claims the reduction of RF-EMF exposure to the safe limit human. The RF exposure restriction guideline used by many agencies was established in 1998 by the International Commission on

Non-Ionizing Radiation Protection (ICNIRP) and was based only on established short-term thermal (heating) effects from RF radiation neglecting non-thermal biological effects. Induction of cancer from long-term EMF exposure was not considered to be established, and so these guidelines are based on short-term, immediate health effects such as stimulation of peripheral nerves & muscles, shocks due to elevated tissue temperatures resulting from absorption of energy during exposure to EMF. In the case of potential long-term effects of exposure, such as an increased risk of cancer, ICNIRP concluded that available data are insufficient to provide a basis for setting exposure restrictions, although epidemiological research has provided suggestive evidence of an association between possible carcinogenic effects.[67]

This is an exceptional statement by ICNIRP, and found in many statements of groups following the ICNIRP philosophy like the AGNIR and on the WHO EMF Project's homepage as well, that epidemiology found 'suggestive, but unconvincing' evidence. What is convincing or not is so decidedly subjective that no scientific body will ever make this as a basis for a decision. There might be gaps in knowledge that make it difficult to decide about the mechanisms that underlie an observation & even an observation could be considered unreliable but the conviction must not enter a rational discourse about a scientific issue.

The guidelines were updated in 2009 but still do not cover cancer and other long-term or non-thermal health effects. ICNIRP gives the guideline 2 to 10 W/m^2 for RF radiation depending on frequency, thus only based on a short-term immediate thermal effect.[68] ICNIRP is a private organisation (NGO) based in Germany. New expert members can only be elected by members of ICNIRP. Many of ICNIRP members have ties to the industry that is dependent on the ICNIRP guidelines. The guidelines are of huge economic and strategic importance to the military, telecom/IT and power industry.

In contrast to ICNIRP, the BioInitiative Reports from 2007, updated in 2012, based the evaluation also on non-thermal health effects from RF radiation.[69] The scientific benchmark for possible health risks was defined to be 30 to 60 $\mu W/m^2$. Thus, using the significantly higher guideline by ICNIRP gives a 'green card' to roll out the wireless digital technology thereby not considering non-thermal health effects from RF radiation. Numerous health hazards are disregarded such as cancer,[36] effects on neurotransmitters and neuroprotection,[70,71] blood- brain-barrier,[72,73] cognition,[74,75] psychological addiction,[76] sleep,[77,78] behavioral problems [79,80] and sperm quality.[12,81]

WHO Factsheet (opinion)

A Fact Sheet from WHO issued in June 2011 shortly after the IARC cancer classification in May 2011 stated that 'To date, no adverse health effects have been established as being caused by mobile phone use'.[82] In the WHO Fact Sheet it was also stated that 'WHO will conduct a formal risk assessment of all studied health outcomes from radiofrequency fields exposure by 2012. Why WHO was so keen to make a new risk evaluation shortly after the IARC evaluation. The statement was not based on scientific evidence at that time on a carcinogenic effect from RF radiation. And it was hardly expected that new studies would be published in short time changing the classification of RF radiation as a possible, Group 2B, human carcinogen. Considering the WHO statement of 'no adverse health effects' the aim might have been to undermine the IARC decision and give the telecom industry a 'clean bill' of health.[36] It might, however, be argued that as a result of the IARC classification, it was necessary for WHO to also look at other effects, and not just tumours.

CONCLUSIO N

From the review it is evident that countries around the world are now beginning to get concerned about the impact of mobiles on human health and environment. Radiofrequency waves generated from mobile phones cause potential public health problems. Short-term effects like changes in sleep, heart rate, and blood pressure, and long-term effects like carcinoma (particularly glioma) are well- documented. So there is need for reviewing the existing safety rules taking into account many new studies on the safety of cellphones and other wireless devices and based the review, new laws to be stringently enforced to constantly monitor the RF emitted from the mobile phones, Wi-fi and other digital devices and their base-stations to keep people safe from their harmful

effects. This should be supplemented by mass media to raise awareness among people regarding the possible health effects of radiofrequency emissions from mobile phones and the guidelines to minimize its exposure. There should be a high level scientific body as well in every country to undertake studies based on their respective needs and to put forward recommendations to the legislative bodies to help them update the safety rules for mobile phone and other digital devises. It is the need of the hour to teach young people to be customized, to know when to have the cell phone on, and to avoid becoming the slave of technology instead of its mastery.

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Transradial Retrieval of Broken Catheter After Complex PCI- A Nightmare

C M Shaheen Kabir [1] , Saidur Rahman Khan [2], Mashhud Zia Chowdhury [3], M G Azam [4], Hemanta I Gomes [5], Arifur Rahman [6], Mah-Noor Jahan[7]

ABSTRACT

Transradial access has now a days become a standard of care for percutaneous coronary angiography & intervention. This approach has demonstrated significant reduction in bleeding rate, length of hospital stay and improvement in clinical outcomes when compared to the traditional TF approach. However this novel approach may lead to severe catheter kinking & twisting and further manipulation may require unraveling the catheter and avoiding complication. The fracture of a guide catheter is an uncommon complication during percutaneous coronary intervention (PCI). It sometimes occurs during engagement of the right coronary ostium, when there is excessive twisting of the guide catheter. An interesting case of complete fracture of a 6 Fr Ikari guide catheter in the brachial artery during transradial coronary intervention is presented.

Key words: complication, catheterization, retrieval, transradial access.

INTRODUCTION:

Transradial (TR) arterial access has become the default route for coronary procedures.[1,2] This novel approach offers significant benefits over the traditional transfemoral (TF) approach including reduction of patient discomfort and major bleeding rate, shorter in-hospital stay with immediate mobilization of patients and its use has also been lately expanded for visceral and peripheral interventions.[3] However, the TR approach is technically more demanding due to the small caliber of the arm vessels. One of the issues that might occur with TR access is the fact that the access is associated with a higher rate of catheter looping or kinking over the traditional TF access site, which if not successfully treated may lead to catheter entrapment and vascular injury.

CASE REPORT:

A 58 years old hypertensive, diabetic, dyslipidaemic lady with prior history of PCI to OM & RCA 2 years back was admitted with Unstable Angina. Her ECG revealed inferior ischaemia. Echo revealed normal LV systolic function. Coronary angiogram was done through transradial approach. There was subclavian tortuosity. Left anterior descending (LAD) artery had mild to moderate disease in its mid part. Stent in principal OM branch was patent. Dominant RCA had 70% stenosis in its mid part. Stent in distal RCA was also patent. PLV (Posterior Left Ventricular)

Authors' information:

[1] ***Dr. C M Shaheen Kabir***, *MBBS, MD, FSCAI, FACC, Associate Professor in Cardiology, Ibrahim Cardiac Hospital & Research Institute, Dhaka-1000*

[2] ***Dr. Saidur Rahman Khan***, *MBBS, MD-Card, PhD, FACC, Professor of Cardiology, Ibrahim Cardiac Hospital & Research Institute, Dhaka-1000*

[3] ***Dr. Mashhud Zia Chowdhury***, *MBBS, MD Card, DTCD, FACC, Professor Cardiology, Ibrahim Cardiac Hospital & Research Institute, Dhaka-1000*

[4] ***Dr. MG Azam***, *MBBS, MD, FSCAI, Professor of Cardiology, National Institute of Cardiovascular Diseases, Dhaka-1207*

[5] ***Dr. Hemanta I Gomes***, *MBBS, D-Card, Assistant Professor in Cardiology, Ibrahim Cardiac Hospital & Research Institute, Dhaka-1000*

[6] ***Dr. Arifur Rahman***, *MBBS, D Card, Assistant Professor in Cardiology, Ibrahim Cardiac Hospital & Research Institute, Dhaka-1000*

[7] ***Dr. Mah-Noor Jahan***, *MBBS, DMU, Clinical Sonologist, Department of Radiology & Imaging, Holy Family Red Crescent Medical College Hospital, Dhaka-1000*

Address of Correspondence: ***Dr. C M Shaheen Kabir***, *cell:+8801817578389, e-mail: skabir67@yahoo.com*

branch had 80% proximal disease (Fig 1). So PCI to mid RCA and PLV branch was planned.

Guide catheter Ikari 1.5 5Fr & Guide wire Sion blue were used. Predilataion balloon was 2.0x8 mm. PLV lesion was stented by 2.25x12 mm DES & mid RCA lesion by another 2.75x20 mm DES (Fig 2 & 3). There was sudden displacement of guide catheter before taking final image due to deep inspiration by the patient (Fig 4). Final images revealed TIMI 3 flow in RCA after reengagement of Ikari guide catheter (Fig 5). There was partial dampening of pressure curve on monitor. Fluoroscopy revealed a tight knot within the right brachial artery along with the PTCA guide wire (Fig 6). Repeated clock & anticlockwise rotation to unloop the knot were unsuccessful. So a long guide wire was advanced to untie the knot but failed (Fig 7). Guide catheter was broken into two pieces at the level of elbow (Fig 8). Proximal part of broken catheter was removed through the radial sheath. Snare catheter was used to retrieve the remaining broken segment but failed(Fig 9 & 10). Finally a 6 Fr JR guiding catheter was advanced and the distal part of the broken catheter was captivated into the JR guiding catheter and was removed successfully through the ipsilateral radial approach (Fig 11-14). Contrast was injected from the sheath to confirm patency of brachial artery. The patient was discharged on day 2 in a stable state.

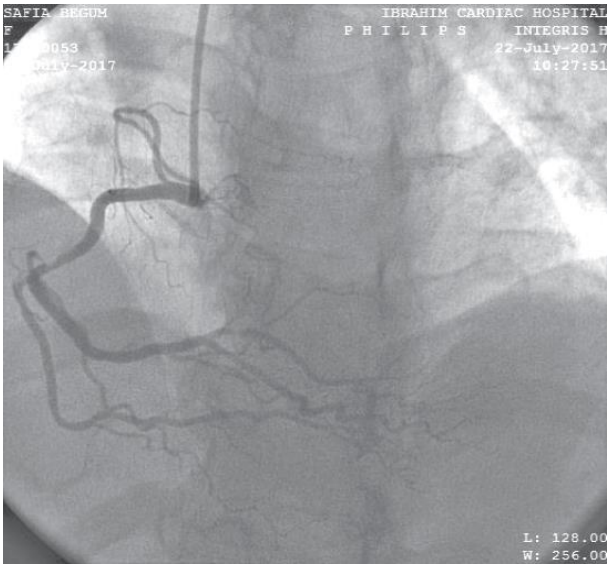

Figure 1: Right coronary artery angiography

Figure 2 : PLV lesion was stented by 2.25x12 mm DES

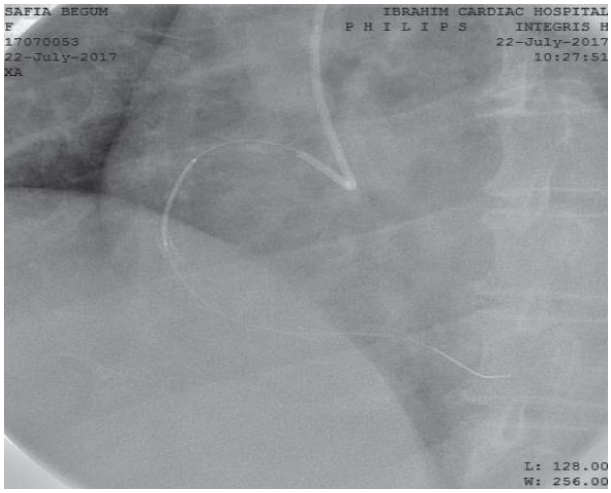

Figure 3 : Mid RCA lesion was stented by 2.75X20 mm DES

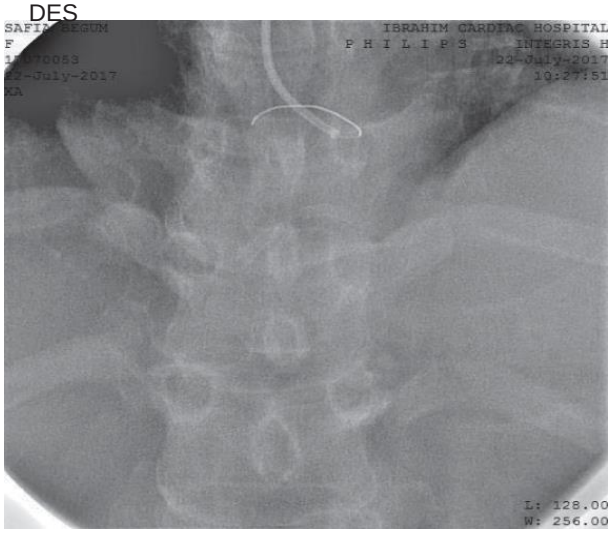

Figure 4 : Guide catheter was displaced before taking final image

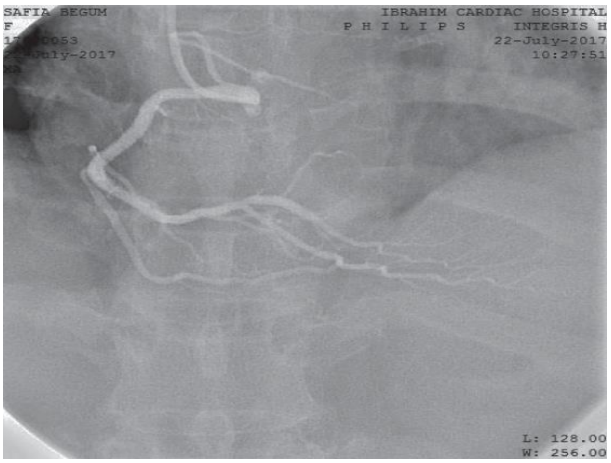

Figure 5 : Distal TIMI 3 flow in RCA after reengagement of guide catheter

Figure 8 : Complete fracture of the Ikari guide catheter into two pieces

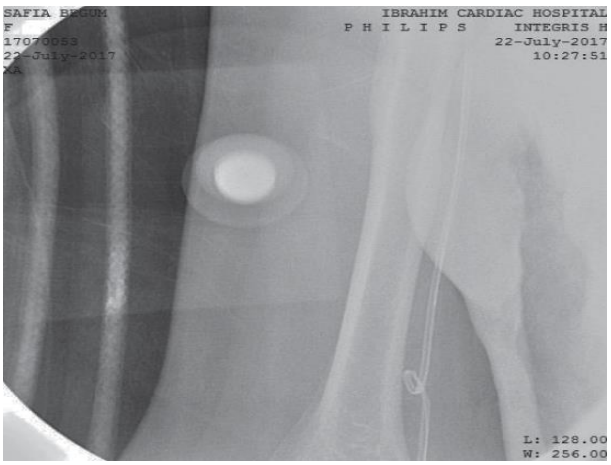

Figure 6 : Fluoroscopy revealed a tight knot within the right brachial artery along with guidewire inside the guide catheter

Figure 9 : Attempt to snare the distal part of retained catheter using a snare

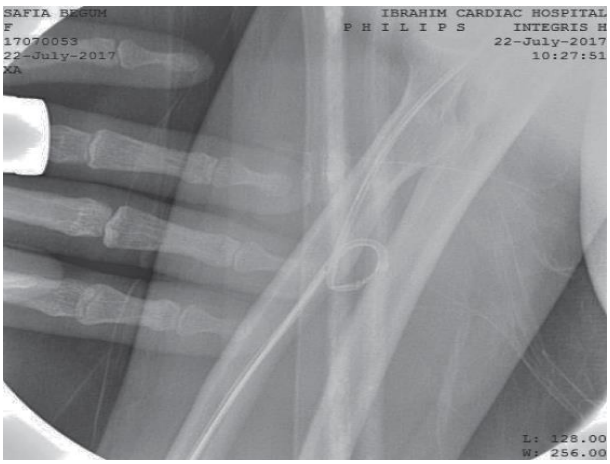

Figure 7 : A standard wire was advanced to unravel the catheter knot

Figure 10 : Retrieval using a snare was attempted several times but failed.

Figure 11 : Successful removal of distal part of the broken catheter using a 6 Fr guide catheter

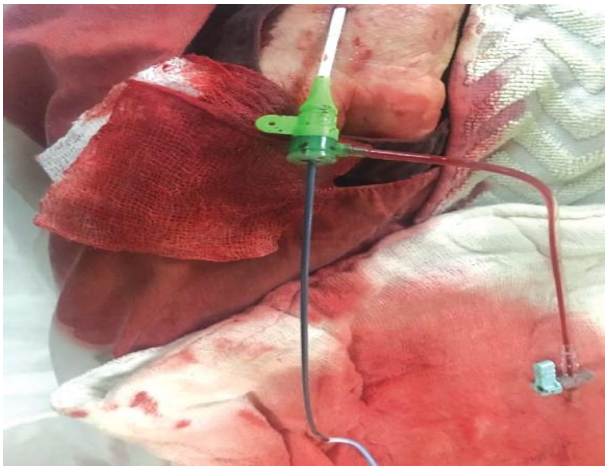

Figure 12 : Distal part of Ikari catheter was captivated into the JR guide catheter and was taken out

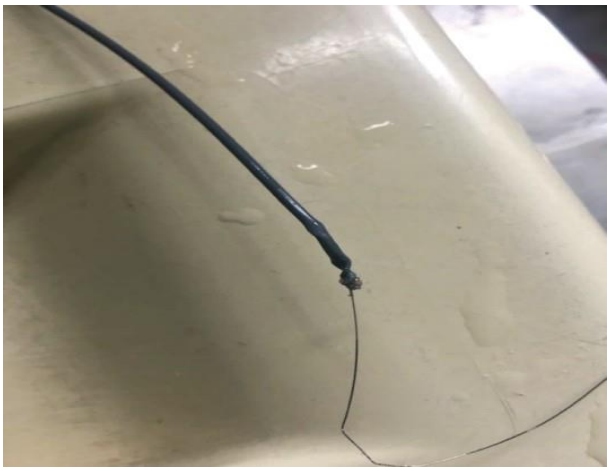

Figure 13 : Retrieved distal part of the catheter part with guidewire inside the guide catheter

Figure 14 : Retrieved proximal part of the guide catheter

DISCUSSION:

TR access has now a days become a standard of care for percutaneous coronary angiography & intervention.[4,5] This approach has demonstrated significant reduction in bleeding rate, length of hospital stay & improvement in clinical outcomes when compared to the traditional TF approach.[6] However this novel approach may lead to severe catheter kinking & twisting & which may require further manipulation to unravel the catheter & avoid complication.[7]

The etiology of kinking/looping and potential entrapment of the catheter after a TR access is multifactorial: Excessive manipulation combined with significant vessel tortuosity results in increased resistance & loss of one-to-one torque resulting in a higher chance of downstream looping & kinking. Forced manipulation to relieve the loop in the brachial or radial arteries increases the probability of vasospasm due to significant smooth muscular component of the artery along with high density of alpha-1 adrenergic receptors, resulting in catheter entrapment.[8,9]

One of the first methods for the prevention of catheter looping is using preferentially the left radial artery for TR procedures especially in the elderly patients. The right subclavian tortuosity is known to be characterized as moderate twice more often in comparison with that of left side. The difference is even more prominent in octogenarians where severe tortuosity is present 5 times more

frequently on the right side than on the left (32 vs. 6%, p=0.002).[10] Another way of preventing severe kinking and looping is trying to avoid the rotation of the catheter for more than 180°. A technical suggestion is to maintain a guide wire in the catheter lumen. Another suggestion is to monitor carefully the catheter pressure tracings during manipulations. In our case, partial dampening of the pressure curve was the likely cause of severe catheter kinking. Therefore, further manipulations needs to be avoided to reduce the risk of catheter entrapment.[11]

The documented non-surgical techniques of unraveling a kinked & entrapped catheter include: 1) Gentle rotation of the catheter to the opposite direction 2) Advancement of a standard 0.035 inches J wire or a super stiff wire into the loop 3) External fixation of the distal part of the catheter at the arm level both by putting circumferential pressure on the arm with the hands or with a BP cuff 4) Snare delivery 5) Long sheath technique 6) Wire-balloon aided retrieval technique 7) Sheathless guide catheter retrieval technique.[12]

CONCLUSION:

We need to recognize that since its introduction TR access has gained worldwide acceptance. As TR approach becomes more diffusely used, complications related to this procedure will likely be encountered more frequently. Intravascular fracture of catheters is very uncommon. Extra care should be taken when engaging an Ikari guiding catheter using the TR approach to minimize the risk of excessive twisting which may lead to catheter fracture. All retrieval techniques are part of endovascular practice & need to be known & applied where necessary.

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Lumbar Epidural Cavernous Hemangioma : A Case Report

Kanuj Kumar Barman[1], Akhlaque Hossain Khan [2], Md. Tauhidur Rahman [3], Bishnu Pada Dey [4] , Md. Jalal Uddin [5]

ABSTRAC T

A 34 year smale patient presented with diffuse low-back pain with bilateral radiculopathy for 8 months duration.The magnetic resonance imaging showed an extradural space occupying lesion in spinal canal from L2 to L5 vertebral levels. The mass was well-marginated with bone involvement. Radiological diagnosis was questionable. The patient underwent L2 to L5 laminectomy under general anesthesia. Intraoperatively, the tumor was purely extradural in location with devoid of attachment to the nerves or dura. Total excision of the extradural compressing mass was not possible due to high vascularity. Histopathology revealed cavernous hemangioma. Purely epidural hemangiomas are uncommon and should be considered in the differential diagnosis of spinal epidural soft tissue masses. Findings that may help differentiate this lesion from the disk prolapse include more common meningiomas and nerve sheath tumors. Early diagnosis and complete removal is the treatment of choice.

Key Words: Lumbar, Epidural, Cavernous Hemangioma.

INTRODUCTIO N:

Extradural cavernous hemangiomas are very rare. In most cases, they arise from the vertebral bodies and extend into the extradural space.[1,2,3] Purely extradural cavernous hemangiomas without any vertebral body involvement are extremely rare and account for only 4% of all extradural spinal tumors.[3,4] They are most commonly located in the posterior aspect of the thoracic epidural space and are rarely found in the lumbar space.[1,2,3,5] Clinically, they can cause symptoms of radiculopathy, which causes misdiagnosis as herniated intervertebral disc disease. In the present study, we are presenting a rare case of a pure lumbar epidural cavernous hemangioma at the L4-5 level with its preoperative diagnosis and the outcome of surgical treatment.

CASE REPORT:

The patient was a 34 years male who had been suffering from low-back pain with radiation towards the lateral thigh down to great toe for the last 8 months and symptoms were exacerbated within the past 3 months. He had no weakness in either of the lower extremities. Upon neurological examination; tone, power, deep tendon reflexes of both lower extremities were normal and sphincter function was intact. The patient had no significant past medical history and the laboratory tests were within normal limits.

On Lumbosacral spine magnetic resonance imaging (MRI), a spiral epidural mass was seen as isointense on T1WI and hyperintense on T2WI with heterogeneous gadolinium-enhancement T1WI at

Authors' information:

[1] ***Dr. Kanuj Kumar Barman***, *Associate Professor, Department of Neurology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh*

[2] ***Prof. Dr. Akhlaque Hossain Khan***, *Department of Neurosurgery, Bangabandhu Sheikh Mujib Medical University, Dhaka , Bangladesh*

[3] ***Dr. Md. Tauhidur Rahman***, *Resident, Departments of Neurosurgery, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh*

[4] ***Dr. Bishnu Pada Dey***, *Assistant Professor, Department of Pathology; Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh*

[5] ***Prof. Dr. Md. Jalal Uddin***, *Department of Neurology, Mymensingh Medical College, Mymensingh, Bangladesh*

Correspondence : ***Dr. Kanuj Kumar Barman***, *Phone: +880 1931646543, E-mail: kanuj_barman@yahoo.com*

the level of L 2-5. Additionally, posterior body L 3,4 showed significant contrast enhancement (Figure 1,2).

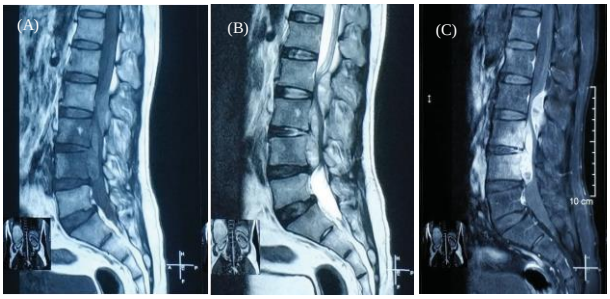

Figure 1 : MRI Sagittal view showing an epidural mass which was occupying post aspect of spinal cord at L2, anterior aspect at L3,4 level; seen as isointense on T1WI (A) and hyperintense on T2WI (B) and heterogeneous enhancement on post contrast film (C). More than half of the L3,4 vertebral body had shown involvement by the lesion.

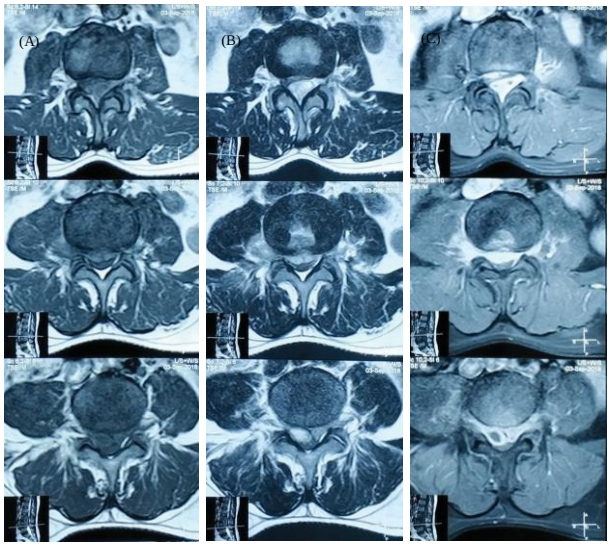

Figure 2 : MRI multiple axial view showing isointense on T1WI (A) and hyperintense on T2WI (B) and heterogeneous enhancement (C) within the lesion.

Neural elements decompression was done by laminectomy L[2,3,4] and a reddish brown mass with a soft consistency was found while the thecal sac was retracted. It was highly vascular and significant bleeding occurred during the operation. The mass was removed partially and hemostasis was achieved. Neurological deterioration did not occur during the postoperative period.

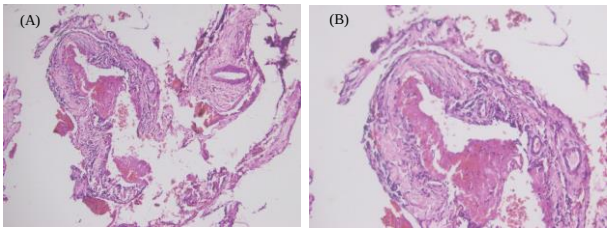

Figure 3: Histopathology showed cavernous hemangioma. (A) ×4 and (B) ×10 showing large dilated vascular spaces containing blood, lined by a single layer of endothelium.

HISTOPATHOLOGY

Histopathology revealed cavernous hemangioma (Fig.3). Multiple dilated and ectatic vascular channels were found on histology which were closely spaced and contained blood. A single layer of benign endothelial cell lines the spaces. Nuclear pleomorphism and mitotic figures were not seen.

DISCUSSION

Cavernous hemangiomas may be found in multiple systems of the body.[6] However, spinal cavernous hemangiomas are relatively rare with majority originates from the vertebral body and extends into the epidural space. A pure spinal epidural cavernous hemangioma is rare and was first reported in 1929 by Globus and Doshay.[7]

Cavernous hemangiomas are hematomas composed of small capillaries covered with a single layer of endothelium, characterized by lobules, separated by fibrous connective tissue septa and composed of irregular and dilated vascular channels.[2,10] Clinical symptoms are caused by the mass effect, vascular movements, hemorrhage, thrombosis, cysts or cavern formation.

Surgical resection is the sole cure if the final diagnosis is a spinal cavernous hemangioma. But it is very difficult to diagnose before surgery. A study by Tekkoket al.[11] reported on 14 surgical resections of cavernous hemangioma, none of which was diagnosed preoperatively.

MRI is the most useful method to diagnose a cavernous hemangioma and differentiate from other diseases like intervertebral disc herniation, schwannoma, neurofibroma, angiolipoma, osteochondroma, synovial cyst, lymphoma, chordoma and Ewing's sarcoma. For example, intervertebral disc herniation may present with none or peripheral enhancement and schwannoma may present less enhanced or neural foraminal widening; whereas lymphoma presents as isointenseon T2WI. In the case of angiolipoma, hyperintensity on T1WI can be observed owing to its high fat content.[8,9,12-15]

Surgical excision is recommended as early as possible because cavernous hemangiomas have a tendency to bleed and grow[9]. Massive bleeding can occur during the operation due to their hyper vascularity. En-bloc resection after coagulation is preferred.[4,6,14] In cases of incomplete resection, radiation therapy has been suggested to control the tumor growth. Sohn et al. suggested performing stereotactic radiotherapy (32 Gy in 4 fractions).[16]

CONCLUSION

Pure spinal epidural cavernous hemangioma is very rare. The symptoms of radiculopathy due to this problem are similar with those of intervertebral disc herniation and it is difficult to make diagnosis preoperatively. MRI is an important diagnostic tool which can differentiate it from other diseases, and early surgical treatment is of utmost significance.

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Reviewers of Current Issue

Dr. Shiuly Chowdhury
Associate Professor (Obstetrics and Gynaecology)
BSMMU, Shahbag, Dhaka

Dr. Md. Abdur Rashid
MBBS, MPH PhD
Ex Associate Professor of Community Medicine
Rajshahi Medical College, Rajshahi
Cell: 01711359490
E-mail: rashidrashidrmc@gmail.com

Prof. Dr. Mashhud Zia Chowdhury
MBBS, DTCD, MD (Card), FACC (USA)
Clinical & Interventional Cardiology
Senior Consultant
Ibrahim Cardiac Hospital & Research institute (ICHRI), Shahbag, Dhaka

Dr. Khandker Md. Akhtaruzzaman
MBBS; DCM; MCPS (Medicine); MD (Cardiology)
Medicine & Heart Specialist
Associate Professor & Head, Department of Cardiology
Sylhet Women's Medical College & Hospital, Sylhet.
Cell: 01711349734
E-mail: drakhtar1960@yahoo.com

Dr. Sahela Nasrin
MBBS, MCPS (Med), MD (Card)
Assistant Professor
Ibrahim Cardiac Hospital & Research Institute (ICHRI), Shahbag, Dhaka

Dr. F. Aaysha Cader
MBBS, MRCP (UK), MD (Cardiology)
Registrar, Department of Cardiology
Ibrahim Cardiac Hospital & Research institute (ICHRI), Shahbag, Dhaka

ইব্রাহিম কার্ডিয়াক
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IBRAHIM CARDIAC
HOSPITAL & RESEARCH INSTITUTE

(An Enterprise of Diabetic Association of Bangladesh)

122, Kazi Nazrul Islam Avenue, Shahbag, Dhaka-1000, Bangladesh
Tel : 88-02-9671141-43, 9671145-47, 9674031, 9670034, **Hot Line** : 10677, 01713-003004
Fax : 88-02-9635380, E-mail: info@ibrahimcardiac.org.bd
Web: www.ibrahimcardiac.org.bd, Facebook : www.facebook.com/ichridhaka

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