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Journal of Diabetic Association Medical College, Faridpur (JDAMC)

Vol. 7, No. 1, January 2023

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Papers for publication should be sent to Editor-in-Chief, JDAMC, Diabetic Association Medical College, Faridpur, Bangladesh. Only Scientific papers written in English will be accepted. While every effort is always made by the editorial board to avoid inaccurate or misleading information appearing in JDAMC, information within the individual article are the responsibility of its author(s), JDAMC and its editorial board accept no liability whatsoever for the consequences of any such inaccurate and misleading information, opinion or statement.

Published by: Professor Dr. Jitesh Chandra Saha
Editor-in-Chief, JDAMC

Designed by : Nizam Khan

Printed by : Radiant Printing & Packaging
27, Nilkhet Babupura, New Market
Dhaka-1205. Phone: 01712571681

Address of correspondence: Editor-in-Chief, JDAMC
1st Floor, Room No-204, Diabetic Association Medical College, Faridpur.
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Web Address: www.damcf.edu.bd/journal.html; E-mail: journal.damcf@gmail.com

Climate Change and Its Impact on Health

Khandaker S

Without nature, human being is nothing. In spite of this, humans are destroying the environment and the living creatures that call our planet home at unprecedented rates at our own peril. From increasing the threat of disease to disrupting our global food chain, biodiversity loss across the globe is threatening the very foundation of our future and the well-being of everyone, everywhere. The catastrophic effects of climate change on human health are already on display like famines triggered by once-in-a-century droughts or flooding; death and suffering wrought by some of the strongest hurricanes and heat waves in modern history.¹

Because habitat destruction brings humans and wildlife into closer contact, it dramatically increases our risk of exposure to “zoonotic spillover,” which occurs when pathogens- bacteria or viruses that cause disease jump from animals to humans. In fact, more than 75% of emerging infectious diseases in humans are caused by pathogens that originally circulated in animals, leading to millions of deaths each year. According to some estimates, as many as 1.6 million viruses are contained within mammals and birds across the globe, some of which could be deadly if or when they become transmissible to humans.¹

A 2022 review published in *Nature Climate Change* showed that of 375 infectious diseases studied, 218 (58%) have been aggravated by climate change. Outbreaks of infectious diseases are now being linked directly to global warming, with the risk spreading beyond tropical regions to temperate zones too. 'flesh-eating bacteria' or *Vibrio vulnificus*. edging into cooler waters, erratic weather conditions causing cholera outbreaks. One in two of us are now at risk of dengue, Malaria-spreading mosquitoes are expanding their habitats.²

Climate change is expected to exacerbate health problems that already pose a major burden to vulnerable populations. Climate change will bring new and emerging health issues, including heat waves and other extreme events. Heat stress can make working conditions unbearable and increase the risk of cardiovascular, respiratory and renal diseases. Malnutrition and under nutrition were highlighted as a concern for a number of developing countries in Africa, Asia and Latin America, which discussed the impacts of climate change on food security, particularly in relation to floods and drought.³

Climate change is directly contributing to humanitarian

emergencies from heatwaves, wildfires, floods, tropical storms and hurricanes and they are increasing in scale, frequency and intensity. Research shows that 3.6 billion people already live in areas highly susceptible to climate change. Between 2030 and 2050, climate change is expected to cause approximately 250, 000 additional deaths per year, from under nutrition, malaria, diarrhoea and heat stress alone. The direct damage costs to health (excluding costs in health-determining sectors such as agriculture and water and sanitation) is estimated to be between US\$ 2-4 billion per year by 2030. Areas with weak health infrastructure- mostly in developing countries – will be the least able to cope without assistance to prepare and respond. Climate change is also having an impact on our health workforce and infrastructure, reducing capacity to provide universal health coverage (UHC).⁴

Human health is severely undermined by climate change.⁵ Bangladesh, one of the South Asian countries, has started experiencing major public health impacts of climate change due to its vulnerable geographical location.⁶ The country is facing new challenges including increased incidences of climate sensitive diseases such as dengue, chikungunya, kalazaar, cholera, malnutrition and so on. Disease patterns are aggravating because of changes in both primary (e.g. temperature and rainfall) and secondary elements (drought, salinity intrusion, sea level rise, recurrent flood, flash flood) of climate change.⁷ After floods, cyclones and droughts waterborne diseases are more prevalent. The distribution and frequency of vector-borne diseases are changing due to temperature variations across various regions depending on the spatial and temporal dimensions. During extreme heat and extreme cold deaths and hospital admissions of children are increasing. Healthcare infrastructure and equipment are getting damaged and destroyed with disaster or extreme weather events, which disrupt healthcare services. The World Bank states that about 0.2 million people were killed by natural disasters during 1980-2010 in Bangladesh.⁸ It indicates that about 6,188 people died each year during above-mentioned period due to disasters in the country.⁹ WHO estimates that by 2070 at least 117 million people will be at risk of malaria under a rapid emission reduction scenario, and this might be 147 million under a high emission scenario.¹⁰ Due to climate change around 19.4 million children are at risks in 20 out of 64 districts in Bangladesh.⁵ Currently, people of many Asian countries including Bangladesh, Malaysia, Singapore, Philippines, Cambodia, Laos, Vietnam are suffering from Dengue fever.⁸ From 1 January to 7 August 2023, the Ministry of Health and Family Welfare of Bangladesh reported a total of 69 483 laboratory-confirmed dengue cases and 327 related deaths, with a case fatality rate (CFR) of 0.47%.¹¹

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Extreme climatic events causing decreased food production and inadequate supply affect health, education, child nutrition and income sources of the households. With rising food prices, dietary diversity, quality, and quantity decline placing vulnerable populations at increased risk of malnutrition. In Bangladesh different studies on nutritional status showed that the percentage of stunted and underweight children in rural areas is significantly higher compared to children in urban areas (45% compared with 36%). At the national level, 51% of children under the age of five years are stunted, 56% underweight and 14.7% are wasted by international standards. Per capita dietary energy supply in Bangladesh shows a declining trend. Approximately 47% of Bangladesh's workforce works in the agriculture sector, which also generates 16% of the nation's gross domestic product (GDP).¹² Agriculture provides a livelihood for many rural communities, but it is facing significant difficulties from climate change.⁷ It has been estimated that by 2050, one in every seven people in Bangladesh will be displaced by climate change. Specifically, with a projected 19.6 inch (50 cm) rise in sea level, Bangladesh may lose approximately 11% of its land by then, and up to 18 million people may have to migrate because of sea-level rise alone. Overwhelmingly, when these migrants move into big cities, they don't find refuge from rural climate challenges, but rather, more and at times worse problems. Thus they will be forced to settle into densely populated urban slums with rudimentary housing conditions, poor sanitation, and limited economic opportunities.^{13,14}

Despite low level of CO₂ emissions (0.3 tonnes per capita according to World Bank, 2009), outdoor air pollution is a major environmental threat to Bangladesh, especially in urban areas. Lead poisoning is likely to be a major public health problem in Bangladesh. The respiratory infections and disease caused by poor air quality, both indoor and urban, may contribute up to 10% of the total burden of disease.¹²

Bangladesh, there is still a lack of research and capacity in this field and its ever-increasing level of vulnerability of the people. Linkage between climate change and the increased incidences of disease, rate of mortality, and availability of safe water has not yet received the proper focus it requires. To avert catastrophic health impacts and prevent millions of climate change-related deaths, the world must limit temperature rise to 1.5°C. Past emissions have already made a certain level of global temperature rise and other changes to the climate inevitable. Global heating of even 1.5°C is not considered safe, however; every additional tenth of a degree of warming will take a serious toll on people's lives and health.

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A Comparison of Dissection Method and Diathermy Cauterization Tonsillectomies

Rahman MS¹, Biswash NN², Roy D³, Alam MS⁴

Abstract

Background: Tonsillectomy is one of the most common procedures performed by otolaryngologists. It is a surgical operation that removes both Palatine tonsils from the tonsillar fossa. It is typically performed in youngsters for recurrent tonsillitis and tonsillar hypertrophy.

Objective: To compared the dissection and diathermy methods of tonsillectomy and evaluate their advantages and disadvantages during surgery and convalescence.

Methods: This is was a retrospective analysis of 400 patients from January 2015 to January 2020 of otorhinolaryngology department in Banga Bandhu Sheikh Mujib Medical Collage Hospital. Out of total 400 patients 200 patients underwent tonsillectomy by dissection method and rest 200 patients underwent electro cautery method. Data were generated through record review using a checklist. A total of 400 patients were analyzed in respect of operation methods, operation time, and amount of blood loss, post operative complications, duration of hospital stay in addition to age & sex distribution separately for comparison.

Results: The overall hospital stayinng in both types was 1-3 days. The average intra operative blood loss was 5-7 ml with cautery and average 50 ml with dissection method. The average operative time was 25-30 minutes with dissection method and 10-15 minutes with cautery. We found higher amounts of blood loss and intra - operative time with dissection method than electrocautery. The Chance of Secondary haemorrhage was more in electro - cautery method than dissection method. Pain, Scar formation, odynophagia were more in cauterization method. Complete healing time was more in cauterization method than dissection method. There was no death in both methods.

Conclusion: Although per- operative blood loss, operative time were less in cauterization method but post operative bleeding, pain, odynophagia and infection were more in electro cauterization method. In both methods, there were some advantages and some disadvantages.

Keywords: Tonsillectomy, dissection method & diathermy method.

Introduction

Tonsillectomy is one of the commonly performed operations undertaken by otolaryngologists. It is a surgical procedure in which both Palatine tonsils are removed from

the tonsillar fossa. It is usually performed for recurrent tonsillitis and tonsillar hypertrophy and usually done in children.¹ It is one of the commonest ENT procedures done in paediatric population, the technique of which has evolved over years to decrease the morbidity associated with the surgery.² Various methods of tonsillectomy have been practiced and oriented around reducing or eliminating both intra-operative and post-operative morbidity in the patients.³ Every technique has advantages and disadvantages. Any advancement in this surgery should reduce surgical time, blood loss, postoperative bleeding, and, most importantly, postoperative morbidity. With the increased popularity of day-case surgery, fast procedures with short recovery are preferred. If at all feasible, the procedure should be painless, allowing for a quicker return to normal food and everyday activities.⁴

In this study, we will compare the dissection and diathermy methods of tonsillectomy and evaluate their advantages and disadvantages during surgery and convalescence. Unlike most operative procedures, which are closed primarily, tonsillectomy produces an open wound that heals by secondary intention. The major postoperative morbidity problems are pain and hemorrhage.

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Materials and Methods

This is a retrospective analysis of 400 patients from January 2015 to January 2020 of otorhinolaryngology Department in Bangabandhu Sheikh Mujib Medical College. Out of total 400 patients 200 patients underwent tonsillectomy by dissection method and rest 200 patients underwent electrocautery method and selected purposively. Data were generated through record review of 400 patients using a checklist and were analyzed in respect of operation methods, operation time, and amount of blood loss, post operative complications, duration of hospital stay in addition to age & sex distribution separately for comparison. In this comparison of operation methods, Tonsillectomy by electrocautery was defined as tonsillectomy performed with electrocautery dissection (bipolar) with hemostasis also being achieved by electrocautery. On the other hand, dissection method tonsillectomy was defined as tonsillectomy performed by a combination of sharp and blunt dissection, hemostasis being obtained with ligature or minimal electrocautery (bipolar). The complications were divided into pre-operative, postoperative and late. Pre-operative complications like, damage to lips tongue pharyngeal wall, TM joint dislocation and bleeding were those occurring during the operation and post-operative complications like bleeding, infections and otalgia occurred immediately after the operation upto 4 weeks. Any complications like; pharyngeal and palatal scarring, tonsillar remnants and voice changes after 4 weeks were classified as late complications.

Results

Table 1 shows that in dissection method group, majority 65 (32.5%) patients belonged to age group 11-20 years and in cauterization method group 70 (35.0%) belonged to age group 4-10 years. Male patients were predominant in both groups, that was 110 (55.0%) in dissection method group and 115 (57.5%) in cauterization method group. Age, sex difference was not statistically significant compared with between two groups ($p>0.05$). Table 2 shows that time duration of operation was significantly higher in dissection method group than cauterization method group ($p=0.001$). Table 3 shows that blood loss was significantly higher in dissection method group than cauterization method group ($p=0.001$). Table 4 shows that secondary haemorrhage, referred otalgia and fever was significant higher in cauterization method group than dissection method group. However, odynophagia was significantly higher in dissection method group than cauterization method group. Regarding hospital stay, most of the patients need hospital stay 1 day in both groups, that was 187(93.5%) in dissection method group and 182(91.0%) in cauterization method group. The difference was not statistically significant ($p>0.05$) between two groups (Table-5).

Table 1: Distribution of operation methods by age and sex of patients under study (n=200+200)

Post operative complications	Dissection method		Cauterization method		p value
	Number	%	Number	%	p value
Age in years					
4-10	60	30.0	70	35.0	
11-20	65	32.5	69	34.5	
21-30	35	17.5	37	18.5	
31-40	30	15.0	19	9.5	
41-50	10	5.0	5	2.5	
Total	200	100	200	100	0.279
Sex					
Male	110	55.0	115	57.5	0.614
Female	90	45.0	85	42.5	
Total	200	100	200	100	

Table 2: Distribution of operation methods by time mean \pm SD in minutes (n=200+200)

Operation methods	Operation time mean \pm SD	p value
Dissection method	27.6 \pm 1.9	0.001
Cauterization method	12.8 \pm 2.1	

Table 3: Distribution of operation methods by blood loss mean \pm SD in cc/ml (n=200+200)

Operation methods	Blood loss mean \pm SD in cc/ml	p value
Dissection method	50.2 \pm 4.2	0.001
Cauterization method	6.3 \pm 1.3	

Table 4: Distribution of post operative complications by operation methods

Post operative complications	Dissection method(n=200)		Cauterization method(n=200)		p value
	Number	%	Number	%	p value
Primary haemorrhage	8	4.0	2	1.0	0.054
Reactionary of haemorrhage	6	3.0	10	5.0	0.307
Secondary haemorrhage	5	2.5	20	10.0	0.001
Referred otalgia	60	30.0	80	40.0	0.036
Odynophagia	70	35.0	40	20.0	0.001
Fever	10	5.0	25	12.5	0.007

Table 5: Distribution of duration of hospital stay by operation methods (n=200+200)

Duration of hospital stay	Dissection method		Cauterization method		p value
	Number	%	Number	%	
1 day	187	93.5	182	91.0	0.310
2 day	10	5.0	10	5.0	
3 day	3	1.5	8	4.0	
Total	200	100	200	100	

Discussion

In this study it was observed that in dissection method group, majority 65 (32.5%) patients belonged to age group 11-20 years and in cauterization method group 70 (35.0%) belonged to age group 4-10 years. The difference was not statistically significant compared with between two groups ($p>0.05$). Al-Shehri et al.⁴ reported TDT and cauterization were performed. 50 (27 male and 23 female) patients, whose ages ranged from 9 to 16 years old underwent traditional tonsillectomy, 50 (35 male and 15 female) patients whose ages ranged from 8 to 16 years old underwent thorough cauterization. The two groups were similar for demographic parameters. No statistically significant difference was noted for age and gender. Malik et al.⁵ observed that the age of patients was between 13 and 50 years. 120 pts were in the range of 13 to 20 years (60%). 50 pts were in the range of 21 to 30 yrs (25%). 20 pts were in the range of 31 to 40 yrs (10%). 10 pts were in the range of 41 to 50 yrs (5%). Ahmed et al.⁶ reported that the mean age of the patients 15.8 years (SD = 9.4 years) ranging from 4-49 years. The study also observed male patients were predominant in both groups, that was 110 (55.0%) in dissection method group and 115 (57.5%) in cauterization method group. The difference was not statistically significant compared with between two groups ($p>0.05$). Malik et al.⁵ reported out of 200 patients 128 (64%) were males and 36 (36%) were females. The duration of operation time of operation was significantly higher in dissection method group than cauterization method group ($p=0.001$). Al-Shehri et al.⁴ reported the median time spent for the traditional tonsillectomy was 21.5 min (range, 18–25 min) compared to cauterization method that has a median time of 9 min (range, 5–13 min). The difference between mean operative times of the two methods was statistically significant. Ahmed et al.⁶ reported operative time also differed between the two, with diathermy procedures taking an average of 15.7 minutes and dissection-method procedures taking average of 26.9 minutes. Statistical analysis revealed no differences between complications rates for dissection-method and diathermy tonsillectomies. Malik et al.⁵ reported regarding operating time for dissection method, the maximum duration of time taken for surgery was 20 minutes and the minimum was 05 minutes. The average was 12 minutes while considering the operating time for diathermy method, the maximum duration of time taken for surgery

was 10 minutes and the minimum was 03 minutes. The average was 06 minutes.

Moreover, blood loss was significantly higher in dissection method group than cauterization method group ($p=0.001$). Ahmed et al.⁶ per-operative blood loss for each dissection-method tonsillectomy ranged from 50 to 100 ml, with the average being 65 ml. In contrast, per-operative blood loss for diathermy tonsillectomies ranged from 5 ml to 20 ml, with the average being 10 ml. Malik et al.⁵ observed the amount of intraoperative hemorrhage by dissection method varies between 50 milliliters to 150 milliliters with an average of 75 ml. The same variable for diathermy method was in the range of 5 ml to 30 ml at an average of 10ml. Al-Shehri et al.⁴ observed severe bleeding was seen in 6 patients who underwent traditional tonsillectomy. Majority of the patients who underwent the traditional method experienced moderate bleeding (44 out of 50).

In this study observed that secondary haemorrhage, referred otalgia and fever was significant higher in cauterization method group than dissection method group. However, odynophagia was significantly higher in dissection method group than cauterization method group. Al-Shehri et al.⁴ reported there are complications experienced by the patients after undergoing tonsillectomy such as fever, bleeding, and anesthetic complications. There were only a few patients who had fever, bleeding, and other complications related to anesthesia. The most common serious complication of tonsillectomy is delayed hemorrhage, which occurs in 2%–4% of all patients. Most of these bleeds are primary.⁷ Windfuhr⁸ stated that primary bleeding is reported to be seen in the first 24 h after the operation and be more dangerous. Secondary hemorrhage is seen after the first 24 h postoperatively and early measures should be taken, as both bleedings are life-threatening particularly in children. Secondary bleeds can occur at any time during the first two postoperative weeks.⁷ As reported herein, there was no significant benefit in the traditional group compared to cauterization group except that bleeding is lesser in the cauterization method. Most previous studies have shown no significant difference in the postoperative hemorrhage rates. Postoperative bleeding did not influence postoperative pain.^{9,10} Malik et al.⁵ reported postoperative hemorrhage was classified as reactionary, primary and secondary. Regarding the incidence of secondary haemorrhage and postoperative morbidity, a Spanish study found no significant difference between diathermy and ligation method.¹¹ Lassaletta Land Martin G also observed no difference between these two techniques in the incidence of postoperative haemorrhage.¹² Salam MA and Cable in their study found no difference between two procedures in terms of postoperative bleeding.¹³ The results of these studies do match with the observations that are made in this study. Likewise some studies conclude dissection technique as a better one regarding the incidence of post-operative haemorrhage comparing diathermy.¹⁴ Regarding hospital stay, most of the patients need hospital stay 1 day in both groups, that was

187 (93.5%) in dissection method group and 182 (91.0%) in cauterization method group. The difference was not statistically significant ($p>0.05$) between two groups. Ahmed et al.⁶ also reported the average stay of admitted patients was 1.68 days (SD 0.7), with a range of 1-3 days.

Conclusion

The cauterization method had reduced per-operation blood loss and operative time, but the electro cauterization method had greater post-surgical bleeding, discomfort, odynophagia, and infection. There were pros and down sides to both strategies.

Conflict of interest: No

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Evaluation of HbA1c as A Dual Marker for Glycemic Status and Dyslipidemia in Type 2 Diabetes Mellitus

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Abstract

Patients with type 2 diabetes mellitus (T2DM) have a greater risk of development of dyslipidemia that is an important risk factor for cardiovascular disease. The aim of the study is to investigate the role of HbA1c as a dual marker for glycemic status and dyslipidemia in type 2 diabetes mellitus for early intervention to reduce cardiovascular and other complications and their mortality, conducted in the department of Biochemistry Jalalabad Ragib- Rabeya medical college and hospital, Sylhet between the period of October 2020 to September 2021. A total 290 diagnosed type 2 diabetic patients of both sexes were included in this study. Three groups were made on the basis of their glycemic status. HbA1c, triglycerides, total cholesterol, HDL-cholesterol and LDL-cholesterol were measured in all three groups. Worst glycemic group showed statistically significant higher level of triglycerides, total cholesterol and LDL-cholesterol. But HDL-cholesterol was almost same in all three groups. It is observed that there is an association between HbA1C and some lipid parameters. Thus HbA1c is not only a useful biomarker of long term glycemic status but also can be a good predictor of lipid profile.

Keywords: Diabetes Mellitus, HbA₁C, Lipid profile, Dyslipidemia

Introduction

Diabetes mellitus (DM) is a metabolic disease characterized by a state of hyperglycemia caused by defect of insulin action, insulin secretion or both (insulin resistance).^{1,2} For nearly 50 years, two types of diabetes mellitus have been found.³ Type1 diabetes mellitus triggers insulin deficiency because of auto-immune pancreatic β -cell destruction.⁴ Type2 diabetes mellitus is characterized as a heterogeneous disorder where β cell make insulin but pancreas does not secrete it properly.⁵ T2DM is rapidly growing public health problem world wide, with a significant impact on health, quality of life and healthcare system of the countries. It was estimated that in 2017 there was 451 million (age 18-99 year) people with diabetes world wide. These figures were expected to increase 693 million by 2045. It was estimated that almost half of all people (49.7%) living with diabetes are undiagnosed.^{6,7}

T2DM patients are prone to diabetic dyslipidemia, which puts them at risk of developing macro-vascular (stroke, peripheral vascular disease and coronary artery disease) and microvascular (nephropathy, neuropathy and retinopathy) diseases.⁸ Naqvi et al., (2017) have reported for T2DM patients that one of the most common complications linked with uncontrolled hyperglycemia is dyslipidemia.⁹

Lipid abnormalities are associated with diabetes mellitus because enzymes of lipid metabolism are affected by deficiency of insulin action.¹⁰ High Triglycerides (TG), elevated low density lipoprotein cholesterol (LDL-C) and lower high density lipoprotein cholesterol (HDL-C) levels are characteristic features of diabetic dyslipidemia. It occurs due to over production of hepatic and intestinal lipoprotein in form of energy rich substrates as free fatty acids or glucose and due to elevated triglyceride rich lipoproteins (TRLs).¹¹ These elevated TRLs lead to catabolism of HDL, resulting in low HDL cholesterol or decreased VLDL catabolism resulting in hypertriglyceridemia.¹² A study conducted by Begum A, Irfan SR in 2019 reported that significant high values of triglycerides, total cholesterol and LDL-C were seen in bad glycemic control group when compared to good glycemic control group. In worst glycemic control group, the value of HDL-C was significantly lower. They also stated that HbA1c is a predictor of abnormal amounts of lipids present in diabetic patients.¹³

Glycosylated hemoglobin (HbA1c) is an absolute indicator of long term blood glucose control (a reflection of blood sugar control in last 3 months) and is a gold standard of glycemic control in patients with type 2 diabetes mellitus (T2DM).^{14,15} Increased HbA1c has been known as a risk factor for cardiovascular disorders in patients with diabetes. Many individuals with diabetes who have poor glycemic control experience a dyslipidemic state such as an increase in triglycerides (TG), low density lipoprotein

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cholesterol (LDL-C) and decrease in high density lipoprotein cholesterol (HDL-C).^{6,15} Individuals with diabetes accompanied by the co-existence of metabolic syndrome (hypertension, dyslipidemia, abdominal obesity and hyperglycemia) have a very high risk for the occurrence of a cardio vascular complications.^{6,16}

According to the study of Hussein A, Ali et al., 2017 there was significant increase in values of triglycerides, total cholesterol and low density lipoprotein cholesterol and significant decrease was seen in high density lipoprotein cholesterol (HDL-C). The study revealed that HbA1c can be used to predict diabetic dyslipidemia.¹⁷ The interaction between dyslipidemia and hyperglycemia plays an important role in the onset and progression of T2DM and its chronic complication.¹⁸ Glycated hemoglobin (HbA1c) has been finally established as an index of long term glucose concentrations and as a measure of the risk for development of microvascular complications in T2DM.¹⁹ This study has been designed to evaluate the use of glycated hemoglobin (HbA1c) as a dual marker of glycemic status and dyslipidemia in type 2 diabetes mellitus for early intervention to reduce cardiovascular and other related complications and their mortality.

Materials & Methods

A descriptive cross sectional study was done among 290 diagnosed type 2 diabetic patients with age range from 25-60 years of both sex, selected through convenient sampling technique. The study was conducted in the department of Biochemistry Jalalabad Ragib-Rabeya medical college Sylhet and data were collected from both indoor and outdoor of medicine department between the periods of October 2020 to September 2021.

Patients with hypothyroidism, nephritic syndrome, chronic kidney diseases, and familial hyper lipoproteinemia were excluded from the study. Venous blood sample were collected from all participants and serum was separated by centrifugation. This serum was used for analyzing total cholesterol (TC), triglycerides (TG), low density lipoprotein cholesterol (LDL-C), high density lipoprotein cholesterol (HDL-C) and HbA1c was determined by using an auto analyzer. Value of HbA1c was given as percentage

of total hemoglobin and values of all other parameters were given in mg/dl. The grouping of research subjects was based on their HbA1c level (glycemic status). Group-1 (HbA1c 4.2-6.2%) comprised of (66) diabetics having normal glycemic status, Group-2 (HbA1c 6.3-6.8%) comprised of (48) diabetic having good glycemic control and Group-3 (HbA1c >6.8%) comprised of (176) diabetics having worst glycemic control. Data were generated using a checklist and entered and analyzed by using SPSS V 26. The Mean \pm SD was measured for quantitative variables such as lipid profile and HbA1c. Frequency was given for qualitative variable such as gender. One way ANOVA was used for comparison of lipid profile and HbA1c between three groups. A probability (p) value of < 0.05 was considered statistically significant.

Results

The study population comprised of 290 diagnosed T2DM patients. Among them 160 (55.17%) were males and 130 (44.83%) were females as shown below. (Table 1)

Table 1: Distribution of the patients according to gender (n=290)

Gender	Frequency	Percentage
Female	130	44.83%
Male	160	55.17%
Total	290	100%

Table 2: Comparison of HbA1c between males and females (n=290)

Parameter	Mean \pm SD		p-value
	Male n=160	Female n=130	
HbA1c	6.605 \pm 0.8527	6.799 \pm 0.7147	0.040

Table 2 shows, mean and standard deviation of HbA1C in male was (6.605 \pm 0.8527) and in females it was (6.799 \pm 0.7147).

Table 3: Comparison of lipid profile between subjects with normal, good and worst glycemic control

Attributes	HbA1c			p-value
	Group 1 Normal glycemic control (n=66)	Group 2 Good glycemic control (n=48)	Group3 Worst glycemic control (n=176)	
S. Total Cholesterol	213.70 \pm 18.155	273.33 \pm 27.643	324.26 \pm 24.131	0.000*
TG	184.14 \pm 42.668	283.29 \pm 32.072	292.57 \pm 22.886	0.000*
HDL-C	35.60 \pm 2.636	35.46 \pm 2.387	35.48 \pm 2.567	0.950
LDL-C	160.20 \pm 4.568	165.83 \pm 4.834	169.49 \pm 7.552	0.000*

*P- value \leq 0.05 is statistically significant.

Table 3 shows, lipid profile findings such as total cholesterol (TC), triglycerides(TG), low density lipoprotein cholesterol (LDL-C) were significantly higher in group-3 (Poor glycemic control group) than other two groups. But high density lipoprotein cholesterol (HDL-C) in all three groups were almost same. Mean and standard deviation of total cholesterol in group-3 was found (324.26 ± 24.131), group-2 (273.33 ± 27.643) and group-1 (213.70 ± 18.155) respectively. When it was compared it was statistically significant (p value=0.000). The mean and standard deviation of triglycerides were in group-3 (292.57 ± 22.886), group-2 (283.29 ± 32.072) and group-1 (184.14 ± 42.668) respectively. When it was compared it was statistically significant (P-value=0.000). The mean and standard deviation of LDL cholesterol in group 3 (169.49 ± 7.552), group-2 (165.83 ± 4.834) and group-1 (160.20 ± 4.568) respectively and was compared it was statistically significant (P value= 0.000). The mean and standard deviation of HDL cholesterol in group-1 (35.60 ± 2.636), group-2 (35.46 ± 2.387) and group-3 (35.48 ± 2.567) respectively and when it was compared it was not statistically significant (P- value=0.950).

Discussion

The current work revealed that mean value of HbA1c was almost same in males and females, when it was compared it was statistically non-significant (P=0.040). This study showed similarities with the results of study conducted by Glygor R. Talpes S et al., 2011 who also reported that diabetic patients of both gender had similar patterns of glycemic control.²⁰ However the present study was found dissimilar with the study of Prabhavati K, Kirhana K et al., 2014 who documented that female diabetic patients had higher level of HbA1c as compared to males, the reason for this might be obesity which was more common in women.²¹ The impact of gender on glycemic control, specifically HbA1c level, was less clear. In clinical trials, women with type 2 diabetes mellitus have significantly higher HbA1c level and significantly fewer women than men achieved target HbA1c levels of 7% - <8%.²²

In various studies it was observed that the correlation between HbA1c and HDL-C was negative, however there was a positive, significant correlation between HbA1c and TC, LDL-C and TG.^{23,24,25,26} In this study the mean and standard deviation of HDL-C in three groups was almost same that was (35.60 ± 2.636), (35.46 ± 2.387) and (35.48 ± 2.567) in group 1, group 2 and group 3 respectively. When comparison between group 1, group 2 and group 3 was made it was statistically non-significant. This is in agreement with the results from a few other studies,^{17,27} but inconsistent with several studies that reported a notable negative relationship between HbA1c and HDL-C.^{28,29,30} Some studies found described a positive relationship between HbA1c and HDL-C.^{31,32} The mean and standard deviation of total cholesterol in group 1, group 2 and group 3 was (213.70 ± 18.155), (273.33 ± 27.643) and (324.26 ± 24.131) respectively and when it was compared it

was statistically significant (P=0.000). This study was in accordance with the study of Hussain A, Ali I et al., 2017 who documented that patients having worst glycemic control had noticeable higher values of total cholesterol when they were compared with patients having normal or good glycemic control (p=0.004).¹⁷ The mean and standard deviation of triglyceride was in group 1, group 2 and group 3 (184.14 ± 42.668), (283.29 ± 32.072) and (292.57 ± 22.886) respectively and when it was compared it was statistically significant (p=0.000). This study was found concurrence with the study of Muraliswaran P, Elamathi T et al., 2016 who documented that mean and standard deviation of triglyceride in poor glycemic control group was high (162.11 ± 32.34) as compared to normal and good glycemic control group, that was (123.24 ± 34.65) and (117.36 ± 21.44) respectively however, when compared it was found statistically significant (P=0.001).³³ The mean and standard deviation of LDL cholesterol in group 1, group 2 and group 3 were (160.20 ± 4.568), (165.83 ± 4.834) and (169.49 ± 7.552) respectively and when it was compared it was statistically significant (P value=0.000). This study has similarity with the study of Jordan D, Mangling L et al., 2018 who documented that LDL-C had significant positive relationship with HbA1c, elevated level of LDL cholesterol considered as major determinant of cardiovascular risk and coronary atherosclerosis in diabetic patients.³⁴

Conclusion

In this study it was seen a significant correlation between HbA1c and various circulating lipid parameters. The findings clearly suggests that HbA1c has the ability of predicting serum lipid profile in type 2 diabetic patients. Thus dual biomarker capacity of HbA1c (glycemic control as well as lipid profile indicator) can be used for screening of high risk diabetic patients. Therefore an early intervention can reduce cardiovascular and other related complications and their mortality towards improved quality of life indeed.

Conflict of interest: No

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Low Serum Magnesium Level and Complications in Acute Myocardial Infarction

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Abstract

Background: Magnesium has been considered as an important factor in the pathogenesis of acute myocardial infarction and its complications. Magnesium ions are essential for the maintenance of functional integrity of myocardium. It also improves vascular tone, after load and cardiac output, decreases peripheral vascular resistance and cardiac arrhythmias. Serum magnesium concentration has great significance in acute myocardial infarction.

Materials and Methods: This cross-sectional descriptive study was conducted in the Department of Pharmacology & Therapeutics, Rajshahi Medical College in collaboration with the Cardiology department, RMCH between July 2019 to June 2020 to measure the serum magnesium level of the patients and to compare the levels with complications. 50 patients of acute MI included through purposive sampling technique. Data were collected using a checklist from laboratory report.

Results: The mean level of serum magnesium was 1.70 ± 0.37 mg/dl in complicated cases. Serum magnesium level was 2.25 ± 0.15 mg/dl in patients without any complications which was significantly higher than the patients who had multiple complications ($P < 0.001$). These observations suggest that in acute myocardial infarction, patients with low magnesium levels are more prone to get complications.

Conclusion: On basis of findings it can be concluded that, low serum magnesium level can play a crucial role in progression of adverse sequelae in acute myocardial infarction.

Keywords: Acute myocardial infarction, serum magnesium level, troponin-I level

Introduction

Magnesium is an essential mineral naturally found in human beings. This is the fourth abundant micronutrient which serves as a cofactor in more than 300 enzyme systems in our body.¹ There is around 20-24 gm of magnesium present in an adult human. 60% of total body magnesium is present in bones and one third of this magnesium acts as body magnesium reservoir. Almost 35% of total magnesium

is located in high metabolic tissues such as muscles, brain, heart, kidneys and liver. Magnesium in the serum represents only 1% of the total body magnesium.² Its diverse action includes regulation of blood pressure, glycaemic control, lipid peroxidation and maintaining cardiac physiology.³ Magnesium is a well known mineral for maintaining the normal functional integrity and electrical stability of the myocardium. It plays a vital role in the energy balance of cardiomyocytes. Its beneficial effects also include reducing vulnerability to oxygen derived free radicals, improving endothelial function and inhibiting platelet aggregation and adhesion. Magnesium is beneficial for cardiovascular system as it improves myocardial lipid metabolism, reduces cardiac arrhythmias by inhibiting calcium accumulation.² Low level of serum magnesium has association with atherosclerotic acceleration, inducing hyperlipidaemia and subsequent atherogenic deposits in coronary arteries. Low magnesium concentration within the myocardial cell is associated with membrane destabilization and vice versa. Deficiency of magnesium can lead to vasoconstriction and also platelet aggregation as its potent vasodilating role in muscle contraction is hampered.¹ Magnesium deficiency plays a major role in the pathogenesis of cardiovascular diseases both on biochemical and cellular level. It activates adenosine triphosphatase (ATPase) which is important for proper cell membrane function and also the source of energy for the $\text{Na}^+ - \text{K}^+$ pump. Low magnesium level causes decrease in $\text{Na}^+ - \text{K}^+$ pump activity leading to an increase in intracellular sodium concentrations. This increased sodium concentration into the cell alters the membrane potential

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results in arrhythmia. Additionally magnesium modulates the potassium-proton exchange mechanism thus it protects the cell from potassium loss. Intracellular hypomagnesaemia may cause increased sodium and calcium concentration into cell predisposing arterial vasospasm, increased catecholamine release and fatty acid.² Myocardial contractility is affected by magnesium primarily by exerting calcium mobilization. Magnesium acts as a natural antagonist to calcium by competing with calcium for the binding of troponin C and calmodulin. Intracellular calcium is recognized for cardiac excitation-contraction coupling by binding with troponin. Intracellular and extracellular magnesium both control calcium influx into the cells by inhibiting the L-type calcium channels thus prevents intracellular calcium overload and cell toxicity. In acute myocardial infarction (AMI) increased cytosolic calcium leads to an increased risk for arrhythmia.⁴ In myocardial infarction, functional deficit of available magnesium occurs due to trapping of free magnesium in adipocytes. Catecholamine induced lipolysis causes soap formation when free fatty acids are released.⁵ Falling in magnesium concentration would destabilize the membrane potential and make cardiac cells more excitable, thus predisposing to arrhythmias. Further fall in magnesium levels increases calcium influx which was previously inhibited by it resulting increased systemic and pulmonary vascular resistance.⁶ The serum magnesium level was found low in the first 48 hours following a acute myocardial infarction in several investigations. Also levels were found lower in patients with complications, when compared with acute MI patients without complication.⁵ Patients of AMI who have lower level of serum magnesium have more chance to develop tachyarrhythmias.⁶ Hence, it is obvious that serum magnesium concentration has great significance in acute myocardial infarction. This study was an attempt to find out the relation of serum magnesium in reference to these complications.

Materials & Methods

The design of this study was descriptive cross-sectional type. It was carried out in the Department of Pharmacology and Therapeutics in collaboration with Cardiology department of Rajshahi Medical College Hospital. Ethical clearance was obtained from the ERC of Rajshahi Medical College. 50 (age 40- 65 years) clinically diagnosed acute myocardial infarction patients admitting in cardiology department of Rajshahi Medical College Hospital, Rajshahi, was included by convenient / purposive sampling technique. After meeting all inclusion and exclusion criteria and confirmed diagnosis by clinical features, electrocardiography and cardiac enzyme Troponin I; other relevant laboratory investigations were done. Then 3 ml venous blood was taken from each subject in a test tube without anticoagulant. Serum was collected after centrifuging for 15 minutes at 3000 rpm. Then serum magnesium was measured. Measuring of serum magnesium was level was carried out by spectrophotometer using Magnesium Kit. All relevant information's were collected and compiled. Data were processed and analyzed using SPSS (Statistical package for social sciences), version 22.0 by descriptive statistics, unpaired t-Test, Chi-square

test. The level of significance was set at 5% and P- value considered <0.05%

Results

The mean age of the respondents was 54 ± 10.3 years. The highest respondents were in age groups of 51 -65 years which occupied 64% of total study population. Numbers of male respondents were predominant occupying 84%. Majority (66%) of respondents in this study were smoker (Table 1).

Table 1: Distribution of respondents by age, sex and smoking history (n=50)

Attributes	No. of respondents with %
Age (in years)	
<40	6 (12%)
41-50	12 (24%)
51-60	16 (32%)
61-65	16 (32%)
Sex	
Male	42 (84%)
Female	8 (16%)
Smoking history	
Smoker	33 (66%)
Non smoker	17 (34%)

Large numbers of the respondents (66%) were hypertensive and 34% were normotensive. The study showed 30% respondents had past history of ischemic heart disease. However, among 42% respondent concomitant disease was found. In terms of family history of Ischemic heart disease, it found in 62% of the respondents (table 2).

Table 2: Distribution of respondents by Hypertension, Previous Cardiac problems, Concomitant disease and Family history of IHD (n= 50)

Attributes	No. of respondents with %
Hypertension	
Hypertensive	33 (66%)
Normotensive	17 (34%)
Previous cardiac problem	
Present	15 (30%)
Absent	35 (70%)
Concomitant disease	
Present	21 (42%)
Absent	29 (58%)
Family history of IHD	
Present	31 (62%)
Absent	19 (30%)

In this study it was found that 17% respondents had chest pain, 12% had tachycardia, 8% had bradycardia, 4.5% had heart block and 2.5% had heart failure (Table 3).

Table 3: Distribution of respondents by nature of complications after AMI (n=50)

No complications	12 (6%)
Chest pain	34 (17%)
Tachycardia	24 (12%)
Bradycardia	16 (8%)
Heart block	9 (4.5%)
Heart failure	5 (2.5%)

32% Respondents had hypomagnesaemia (<1.6mg/dl) with complications whereas among 68% respondents 50% had serum magnesium ≥ 1.6 mg/dl with complication (Table 4).

Table 4: Serum Magnesium level among complicated and un-complicated patients (n=50)

Serum magnesium level			
	Without complication 09	With complication 41	Total (n= 50)
<1.6 mg/dl	0 (0%)	16 (32%)	16 (32%)
≥ 1.6 mg/dl	9 (18%)	25 (50%)	34 (68%)

Higher serum magnesium level was observed in uncomplicated patients while patients who suffered from multiple complications had lower serum magnesium. Patients with multiple complications the serum magnesium level was 1.79 ± 0.37 and in patients without complications magnesium level was 2.25 ± 0.15 . On comparison between two groups, statistically significant (P-Value = 0.01) difference was found. (Table 5).

Table 5: Mean serum Magnesium level among complicated and un-complicated patients

Serum magnesium level	(n=50)			
	n	Mean \pm SD	t value	p value
Without complications	9	2.25 ± 0.15	-3.537	0.001
With Complications	41	1.79 ± 0.37	-3.537	0.001

Discussion

The age of the patients included in this study was ranging between 30 - 70 years. This study showed highest respondents in age group 51 - 60 years and age group > 60 years which occupied 16 (32%) of the population respectively. These results are similar to findings of Anjum et al. (2013) where 43.3% of patients were in age group 51-60 years.⁷ The sex distribution of the study group showed male predominance. There were 42 (84%) male patients whereas 8 (16%) female. Lakshman Lal and Hiralal Murmu (2016) conducted a study where they observed

similar findings showing 29 male and 11 female patients.¹ Akila et al. (2017) studied with 50 patients of acute myocardial infarction and found smoking was the most common risk factor among 35 patients.⁸ In this present study, similarly we found 33 (66%) smoker among the patients and 17 (34%) were not smoker. "Subramanyam and Vakrani, (2015) subjected the serum magnesium level in 53 patients of acute myocardial infarction, showed hypertension as a high risk factor in their study.⁵ Likewise this study also demonstrated that hypertension was present in 33 (66%) of the patients. In this study, positive history of ischemic heart disease was found 15 (30%) respondents and 35 (70 %) respondents had no history of ischemic heart disease. We found presence of family history of ischemic heart disease as a risk factor among 31 (62%) patients.

In case of presence of concomitant disease, this study revealed that 21 (42%) patients were suffering with other concomitant disease and 29 (58%) patients had no concomitant disease. Similar finding was found in a study conducted by Angeline et al. (2003) where it is stated that diabetes patients are more at risk of developing myocardial infarction.⁹ Family history of ischemic heart disease was absent in 19 (38%) patients. This resembles the finding of Akila et al. (2017) where 10 (20%) patients having positive family history of ischemic heart disease.⁸

In this study mean serum magnesium level was 2.25 ± 0.15 mg/dl in patients without any complications. The patients with multiple complications mean serum magnesium level was 1.70 ± 0.37 mg/dl. On comparison, statistically significant difference was found (P < 0.001). Lowest magnesium level of 1.64 ± 0.36 mg/dl was found in patients with heart failure followed by patients who developed bradycardia having serum magnesium level 1.69 ± 0.36 mg/dl. Comparison of serum magnesium level between patients without complications and with multiple complications groups it was found that 16 patients suffered hypomagnesaemia (<1.6 mg/dl) along with multiple complications. About 25 complicated patients had serum magnesium level ≥ 1.6 mg/dl. All the uncomplicated patients had serum magnesium level ≥ 1.6 mg/dl. Similar findings were found in a study conducted by Nambakam and Girish (2015).⁵ Their study revealed that in complicated cases serum magnesium levels were 1.38 ± 0.03 mg/dl and in patients without complications the level was 1.73 ± 0.29 mg/dl which was statistically significant.⁵ So, the fact is, measuring serum magnesium level had prognostic significance in acute MI. In attempt to find the prognostic value of serum magnesium in various complications, serum magnesium was estimated spectrophotometrically by Govind Mohan et al. (1994) in 53 acute myocardial infarction cases.⁶ The study showed lower serum magnesium levels of 1.26 ± 0.19 mg/dl in 42 cases of acute myocardial infarction with complications compared to 1.41 ± 0.13 mg/dl in 11 patients without complications.⁶

It was observed that patients who died due to arrhythmias and cardiogenic shock followed by pump failure, serum magnesium were lowest in them. Similar study by GQ Khan et al. (2002) reported low serum magnesium in 50 patients of acute myocardial infarction with mean serum Mg levels of 2.2 ± 0.24 mg/dl in controls.¹¹ Further, the serum magnesium level of patients who developed cardiac arrhythmias was found to be comparatively lower. Therefore they concluded that, the low level of Mg in serum can be taken as a sensitive diagnostic index in cases of acute MI.¹⁰ Another study of serum magnesium in acute MI patients conducted by Dr. Naseem Hussain (2018) where the author found statistically significant fall in magnesium level in serum in the patients.¹¹

In summary, this study demonstrated that a significant difference in serum magnesium level in patients with complications and without complications. The serum magnesium level was higher in patients who had no complications than those who suffered multiple complications. Patients who had serum magnesium level <1.6 mg/dl developed more complications. Findings showed that low level of serum magnesium was associated with increased risk of developing more adverse sequels after acute MI. Hypomagnesaemia in early periods of acute MI is responsible for poor prognosis and detection of serum magnesium would have been a helpful alternative for taking action accordingly.

Conclusions

This study revealed the mean serum magnesium level 1.70 ± 0.37 mg/dl in complicated cases and 2.25 ± 0.15 in cases without any complications which was statistically significant. Hypomagnesaemia is recognized as a significant risk parameter for hypertension, cardiac arrhythmias and other ischemic heart diseases contributing pathogenesis of AMI. So, along with other biochemical risks parameters, routine assessment of serum magnesium level estimation can be a useful choice for avoidance of adverse events. Further study with a large group of similar population can be considered in future.

Acknowledgment

First of all, we remember Almighty ALLAH, for giving us the prospect and potency to carry on and complete this research work. Thank to Pharmacology and Cardiology department of Rajshahi Medical College for providing data to complete this study. All author's contributions are equally acknowledged along with contribution of study respondents in particular.

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Nasofacial Anthropometric Study among Adult Santals and Bangalees of Northern Area of Bangladesh

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Abstract

Introduction: Anthropology is the science of human body morphology. In forensic medicine, anthropometric measurements are usually used to identify an individual. Medical scientists, as well as anthropology experts, use facial measurements for several purposes such as identification of congenital and traumatic abnormalities. Facial measurements are interestingly varied between diverse races and ethnicities.

Objective: The objective of this study was to determine the facial and nasal anthropometric measurements of adult Santals and Bangalees residing in Northern area of Bangladesh and to determine their status in relation to other population studied elsewhere.

Design: It was a cross sectional comparative study.

Material and Method: This cross sectional study was conducted in the anatomy department of Rajshahi Medical College, during the period of January 2021 to December 2021. This study was performed on 300 individuals (150 Bangalee and 150 Santal) with normal craniofacial configuration, without history of trauma in the face and no history of nose and face cosmetic surgery such as Septoplasty or Septorhinoplasty. Purposive sampling technique was adopted in this study.

Results: Most common type of face in both the Santals (92%) and the Bangalee (99.30%) respondents in Northern area of Bangladesh was Hyperleptoprosopic type of face. Leptorrhine type was predominant (84%) nasal type among the Bangalee and 51.30% Mesorrhine and 48% Platyrrhine type were predominant nasal type among the adult Santals.

Conclusions: Findings of this study will provide to build database for nasofacial, maxillofacial, cosmetic surgeons & orthodontist which help them in making diagnosis of congenital and traumatic nasofacial anomalies & planning their reconstructive surgeries. The findings of the study may also help forensic experts in identifying the victims and assailants of criminal cases.

Keywords: nasofacial, anthropometry, santals, bangalees,

Introduction

Anthropology is the science of human body morphology, and anthropometric studies are scientific methods and techniques for displaying different measurements and observations on the human being as well as its skeleton.¹

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Anthropometric measurement for each specific population is, therefore, of much importance to determine the genetic and environmental influences on a particular phenotype of a human body, in terms of size, shape, and proportions of one part of the body with another.² In forensic medicine, anthropometric measurements are usually used to identify an individual.³

Medical scientists, as well as anthropology experts, use facial measurements for several purposes such as identification of congenital and traumatic abnormalities.⁴ There are five types of the face in different races according to the Facial Index (FI): Hypereuryprosopic (FI ≤ 78.9), Euryprosopic (FI = 79.0–83.9), Mesoprosopic (FI = 84.0–87.9), Leptoprosopic (FI = 88.0–92.9) and Hyperleptoprosopic (FI ≥ 93.0). The Euryprosopic group has a broad and short face, but the Leptoprosopic group has a tall and narrow face.⁵

The nose shape has great importance in facial beauty, and its dimensions are widely used in facial reconstruction and plastic surgery.⁶ Ethnic influences and environmental, climatic conditions are the two main factors that result in different sizes and shapes of the nose.¹ Furthermore, the nasal measurements (Nasal Height = NH, Nasal Width = NW

and Nasal Index=NI), as anthropometric parameters can be used for distinguishing between different races. There are five types of the nose in different races according to the NI: Hyperleptorrhine (NI≤54.9), Leptorrhine (NI=55-69.9), Mesorrhine (NI=70-84.9), Platyrrhine (NI=85-99.9) and Hyperplatyrrhine (NI≥100).⁵ The white race has a fine nose (Leptorrhine), the blacks have a broad nose (Platyrrhine) and the Orientals have a medium-sized nose (Mesorrhine).⁶

A plethora of studies about the face and nose have been done in various countries, and significant differences were reported in facial and nasal measurements of various ethnicities and races with different skeletal and dental patterns. All these differences have greatly contributed to our knowledge of diversity in facial and nasal size, shape, and proportions.^{7,8}

Also, there is no comparative study between Santals and Bangalees. It might be useful and essential tool to the researchers, clinicians and forensic experts in respect to their field of study. Therefore, the present study attempted to document facial and the nasal anthropometric measurement of the Santals population and to assess the type of face and nose and to assess their facial and nasal measurement in relation to the Bangalee and to determine their status in relation to other population studied elsewhere.

However, none of these studies have yet performed the nasofacial profile of the Bangladeshi population. In view of this fact, the proposed study was conducted to describe the nasofacial anthropometric profile of Santal and Bangalee adults residing in the Northern area of Bangladesh.

Materials and Methods

It was a cross-sectional study. The study was carried out in the Department of Anatomy, Rajshahi Medical College, Rajshahi. over a period of one year from January 2021 to December 2021 Adult Santals and Bangalees aged 18 years and above residing in the northern area of Bangladesh, with normal craniofacial configuration were the study population. The individuals with craniofacial abnormalities, history of trauma, and the face cosmetic surgery, such as septoplasty or septo-rhinoplasty, and subject of mixed parentage were excluded. I have taken 300 populations (Santal 150 and Bangalee 150) due to Pandemic COVID Situation. Purposive sampling technique was adopted in this study. Data were collected using a structured questionnaire (Research instrument) containing the variables of interest. With the help of sliding vernier calipers, measuring tape and weight machine anthropometric measurement were taken.

Data were collected on variables of interest by using a structured questionnaire (Research instrument) by observation as well as measuring different anthropometric parameters of adult of both study groups with the help of Sliding Vernier Calipers, measuring tape and weight machine.

The study was done on 300 adult people including 150 from each study groups. Data were collected from Rajshahi, Naogaon, Pabna, Rangpur, Dinajpur and Gaibandha district. Data collection were commenced after obtaining ethical clearance obtained from the Ethical review committee (ERC) of Rajshahi Medical College, Rajshahi as well as voluntary informed consent was taken from the individual respondent after short briefing of the objectives, rights, benefit of the study and all relevant information's.

Depending upon following formula face should be classified into Hypereuryprosopic (very broad and short face), Eueyprosopic (broad, short face), Mesoprosopic (average face), Hyperleptoprosopic (very tall, narrow face) type. And nose should be classified into Hyperleptorrhine (excessively tall and narrow), Leptorrhine (tall and narrow), Mesorrhine (medium), Platyrrhine (broad and flat) Hyperleptorrhine (excessively broad and flat) type.

All measurements were taken in a neutral position and individual was asked to breathe calmly through their nose with relaxed facial expression without lifting the head. All the measurements were collected by using Vernier Slide Calipers.

- Facial length (FI): Measured from nasion to gnathion in cm.
- Facial width (FW): Measured by distance between to zygion in cm.
- Nasal height (NH): Measured from nasion to subnasale in cm.
- Nasal width (NW): Measured by distance between two ala of the nose in cm.
- Facial index (FI): (Facial length divided by Facial width)X100
- Nasal index (NI): (Nasal height divided by Nasal width)X100

After collecting data, I checked the completeness and internal consistency of questions. Then data were cleaned by editing, coding, recoding and categorizing. Data were rechecked to detect errors and to maintain validity. After entry into the computer result were analyzed according to variables of the study. The summarized data were presented in the form of table with necessary interpretation and inference, appropriated description inferential statistics and test of significance. Then data was finally entered into SPSS file for analysis. The data was analyzed via Statistical Package for the Social Sciences (SPSS, version 25.0, Chicago, IL) software. Quantitative variables were described by the mean & standard deviation (mean ± SD), median with minimum and maximum value of all the parameters of interest were calculated. To compare all aspect of measured nasofacial anthropometric parameters using independent T-test was done. For qualities variables expressed in frequency, percentage and for comparison Chi-square test done. The level of significance was set at 5% and p-value < 0.05 or < .001 were considered as statically significant.

Prior to the commencement, it was approved by the institutional Review Board (IRB) of Rajshahi Medical College. The permission from the Ethical Review

Committee was obtained after informing was obtained after informing thoroughly regarding thesis procedures.

Results

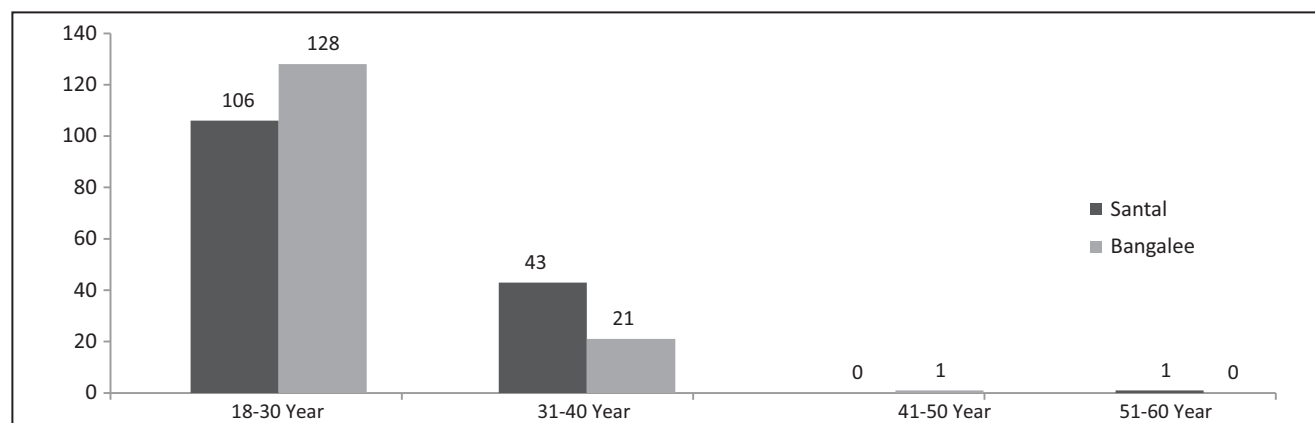


Figure 1: Distribution of the Santal (n=150) and Bangalee (n=150) respondents according to their age category

Figure 1 shows the distribution of the Santal respondents according to their age category. It revealed that Mean (\pm SD) age of the Santal and Bangalee respondents was 28.42 ± 5.16 years and 25.30 ± 4.80 years respectively.

Table 1: Nasofacial anthropometric measurement of Santal respondents (n = 150)

Ethnic group Santals (n=150)	Statistical measurement			
	Mean \pm SD	Median	Minimum	Maximum
FL (Distance between nasion and gnathion in cm)	11.57 \pm 0.84	11.50	9.00	14.10
FW (Distance between two zygions in cm)	11.21 \pm 0.79	11.10	9.00	13.10
Facial index (FL/FWX100)	103.41 \pm 7.91	103.50	86.44	127.00
NH (Distance between the nasion and the subnasale in cm)	5.02 \pm 0.36	5.00	4.00	5.90
NW (Distance between the two alae of the nose in cm)	4.17 \pm 0.47	4.20	3.10	4.90
Nasal index (NW/NLX100)	83.06 \pm 8.20	84.33	63.64	96.08

Table 1 shows the nasofacial anthropometric measurement of Santal respondents (n = 150). It reveals that, mean (\pm SD), median, minimum and maximum distance between nasion and gnathion or FL were 11.57(\pm 0.84) cm, 11.50 cm, 9.0 cm and 14.10 cm respectively. Again mean (\pm SD), median, minimum and maximum distance between two zygions or FW were 11.21(\pm 0.79) cm, 11.10 cm, 9.0 cm and 13.10 cm respectively. Regarding facial index mean (\pm SD), median, minimum and maximum measurement were 103.41 (\pm 7.91), 103.50, 86.44 and 127.00 respectively. Regarding nasal anthropometric measurement, mean (\pm SD), median, minimum and maximum distance between the nasion and the subnasale or NH in cm were 5.02 (\pm 0.36) cm, 5.00 cm, 4.00 cm and 5.90 cm respectively. Again mean (\pm SD), median, minimum and maximum distance between two alae of the nose or NW were 4.17(\pm 0.47) cm, 4.20 cm, 3.10 cm and 4.90 cm respectively. Regarding nasal index mean (\pm SD), median, minimum and maximum measurement were 83.06 (\pm 8.20), 84.33, 63.64 and 96.08 respectively.

Table 2: Nasofacial anthropometric measurement of Bangalee respondents (n = 150)

Ethnic group Bangalees (n=150)	Statistical measurement			
	Mean \pm SD	Median	Minimum	Maximum
FL (Distance between nasion and gnathion in cm)	11.91 \pm 1.06	11.80	10.00	14.70
FW (Distance between two zygions in cm)	10.41 \pm 1.12	10.50	7.40	13.10
Facial index (FL/FWX100)	115.09 \pm 10.29	114.72	91.30	160.81
NH (Distance between the nasion and the subnasale in cm)	5.60 \pm 0.54	5.50	4.40	7.20
NW (Distance between the two alae of the nose in cm)	3.55 \pm .34	3.50	2.80	4.50
Nasal index (NW/NLX100)	63.58 \pm 5.01	63.33	50.85	78.00

Table-2 shows the nasofacial anthropometric measurement of Bangalee respondents (n = 150). It reveals that regarding facial anthropometric measurement among the Bangalee respondents, mean (\pm SD), median, minimum and maximum distance between nasion and gnathion or FL (Facial Length) were 11.91 (\pm 1.06) cm, 11.80 cm, 10.0 cm and 14.70 cm respectively. Again mean (\pm SD), median, minimum and maximum FW (distance between two zygions) were 10.41(\pm 1.12) cm, 10.50 cm, 7.40 cm and 13.10 cm respectively. Regarding facial index mean (\pm SD), median, minimum and maximum measurement were 115.09 (\pm 10.29), 114.72, 91.30 and 160.81 respectively. Regarding nasal anthropometric measurement, mean (\pm SD), median, minimum and maximum NH (distance between the nasion and the subnasale in cm) were 5.60 (\pm 0.54) cm, 5.50 cm, 4.40 cm and 7.20 cm respectively. Again mean (\pm SD), median, minimum and maximum NW (distance between two alae of the nose were) 3.55(\pm 0.34) cm, 3.50 cm, 2.80 cm and 4.50 cm respectively. Regarding nasal index mean (\pm SD), median, minimum and maximum measurement were 63.58 (\pm 5.01), 63.33, 50.85 and 78.00 respectively.

Table 3: Distribution of face type according to Facial Index among the Santal (n=150) and Bangalee respondents (n= 150)

Face type according to facial index among the Santal & Bangalee respondents	Frequency of Santal	Frequency of Bangalee
Mesoprosopic (normoprosopic: average face)	3 (2.0%)	0 (0.00%)
Leptoprosopic (tall, Narrow face)	9 (6.00%)	1 (0.70 %)
Hyperleptoprosopic (very tall and narrow face)	138 (92.00 %)	149 (99.30%)
Total	150 (100.00%)	150 (100%)

Table 3 shows the distribution of face type according to Facial Index among the Santal and Bangalee respondents. It revealed that among the Santal respondents maximum (92%) were Hyperleptoprosopic type of face and some (6.0%) of them were Leptoprosopic type of face and few (2.0%) had Mesoprosopic type of face. Among the Bangalee respondents almost all (99.30%) were Hyperleptoprosopic face and only one respondent (0.70%) was Leptoprosopic face and none of them (0.0%) was Mesoprosopic type of face.

Table 4: Distribution of nasal type according to Nasal Index among the Santal (n=150) and Bangalee(n=150) respondents (n=150)

Nasal type according to Nasal Index among the Santal respondents	Frequency of Santal	Frequency of Bangalee
Leptorrhine (tall and narrow)	1(0.70%)	126 (84.00%)
Mesorrhine (medium)	77 (51.30%)	18 (12.00%)
Platyrrhine (broad and flat)	72 (48.00%)	0 (0.00%)
Hyperleptorrhine (excessively tall and narrow)	0 (0.00%)	6 (4.00%)
Hyperplatyrrhine (excessively broad and flat)	0 (0.00%)	0 (0.00%)
Total	150 (100%)	150 (100%)

Table- 4 shows the distribution of nasal type according to Nasal Index among the Santal and Bangalee respondents. It revealed that above the half (51.30%) of Santal respondents were Mesorrhine nasal type and near half (48.00%) were Platyrrhine nasal type. Only one Santal respondent had Leptorrhine nasal type and none (0.0%) of them was Hyperleptorrhine and Hyperplatyrrhine nasal type and (84.00%) of Bangalee respondents was Leptorrhine nasal type and (12.00%) were Mesorrhine nasal type. Only (4.00%) Bangalee respondents were Hyperleptorrhine and none (0.0%) of them was Platyrrhine and Hyperplatyrrhine nasal type.

Table 5: Relation of nasal type among the Santal and Bangalee ethnic groups according to sex.

Male respondents of both ethnic group			Nasal type according to nasal index				Total
			Hyperleptorrhine	Leptorrhine	Mesorrhine	Platyrrhine	
Male	Ethnic group	Santal (n=74)	0 (0.0%)	0 (0.0%)	30 (40.5%)	44 (59.5%)	74 (100.0%)
		Bngalee (n = 75)	4 (5.3%)	62 (82.7%)	9 (12.0%)	0 (0.0%)	75 (100.0%)
Female	Ethnic group	Santal (n =76)	0 (0.0%)	1 (1.3%)	47 (61.8%)	28 (36.8%)	76 (100.0%)
		Bngalee (n= 75)	2 (2.7%)	64 (85.3%)	9 (12.0%)	0 (0.0%)	75 (100.0%)

$\chi^2 = 121.306$ df (3) $p = .000$, $\chi^2 = 116.846$ df (3) $p = 0.000$

Table 5 shows the relation of nasal type according to Nasal Index among the male respondents of both Santal (n=74) and Bangalee (n=75) ethnic group. It revealed that among the Santal male, Platyrrhine nasal type was higher proportionate than

Bangalee male respondents (SantalvsBangalee= 59.5% vs 0.0%). Among the Bangalee male respondents Leptorrhine nasal type were present in higher proportion than Santal male respondents (BangaleevsSantal = 82.7% vs 0.0%). Mesorrhine nasal type were also present in higher proportion in Bangalee than Santal respondents (SantalvsBangalee = 40.5 % vs 12.0%). Again, Hyperleptorrhine only present among the Bangalee respondents (SantalvsBangalee = 0.0 % vs 5.3%). A chi-square test for independence with $\alpha = .05$ was used to assess whether the nasal type according to Nasal Index among the male respondents were related to their ethnic group. The relation between variables were statistically significant ($2 = 121.31$, $df = 3$, $p < .001$).

Table 6: Distribution of face type among Santal and Bangalee ethnic group respondents according to sex.

Male respondents of both ethnic group		Face type according to facial index		
		Mesorrhine	Leptorrhine	Hyperleptorrhine
Male	Santal (n=74)	0 (0.0%)	0 (0.0%)	74 (100.0%)
	Bngalee (n = 75)	0 (0.0%)	0 (0.0%)	75 (100.0%)
Female	Santal (n =76)	3 (3.9%)	9 (11.8%)	64 (84.2%)
	Bngalee (n= 75)	0 (0.0%)	1 (1.3%)	74 (98.7%)

$\chi^2 = 10.118$ $df(2)$ $p = 0.006$

Table 6 shows that the relation of face type among the female respondents of both Santal and Bangalee ethnic group. It revealed that among the maximum Santal (84.2%) and Bangalee (98.7%) female had Hyperleptoprosopic face type and. Leptoprosopic face type were higher proportionately present among Santal female than Bangalee female respondents (11.8% vs 1.3%) respectively. Mesoprosopic face type only present among the Santal female respondents (SantalvsBangalee=3.9% vs 0.0%). A chi-square test for independence with $\alpha=.05$ was used to assess whether the face type according to Facial Index among the female respondents were related to their ethnic group. The relation between variables were statistically significant ($2 = 10.12$, $df=2$, $p<0.5$).

Table 7: Comparison of the mean value of Facial Index (FI) between the Santal (n=150) and Bangalee (n=150) ethnic groups.

Variable	Ethnic group	n	Mean	SD	t	p
Facial index (FI)	Santal	150	103.54	7.97	7.231	<.001
	Bngalee	150	115.03	10.40		

Independent t test: $t(300) = -10.74$ $p < .000$ two-tailed

Table7 shows an independent samples t-test which was used to compare the difference of mean (\pm SD) difference of Facial Index (FI) between Santal and Bangalee respondents. Shapiro-Wilk statistic was non-significant; indicating that the assumption of normality was not violated and Levene's test were significant; thus, an equal variance cannot be assumed for both groups. The t-test was statistically highly significant, with mean FI, among the Santal ($M = 103.54$, $SD = 7.97$) was lower [Difference of mean was- 11.49 with 95% Confidence Interval of the Difference (-1360, -9.39)] than Bangalee respondents ($M = 115.03$, $SD = 10.40$), $t(300) = -10.74$ $p < .001$, two-tailed.

Table 8: Comparison of mean value of the Nasal index (NI) between the Santal (n=150) and Bangalee (n=150) ethnic group.

Variable	Ethnic group	n	Mean	SD	t	p
Nasal index (FI)	Santal	150	83.02	8.22	24.82	<.001
	Bngalee	150	63.62	4.90		

Independent t test: $t(300) = 24.82$
 $p < .000$ two-tailed

Table-8 shows an independent samples t-test was used to compare the mean (\pm SD) difference of Nasal Index (NI) between Santal and Bangalee respondents. Shapiro- Wilk statistic was non-significant; indicating that the assumption of normality was not violated and Levene's test were significant; thus, an equal variance cannot be assumed for both groups. The t-test was statistically highly significant, with mean NI, among the Santal ($M = 83.02$, $SD = 8.22$) was higher [Difference of mean was 19.40 with 95% Confidence Interval of the Difference (17.86, 20.93)] than Bangalee respondents ($M = 63.62$, $SD = 4.90$), $t(300) = 24.82$ $p < .001$, two-tailed.

Discussion

In a study conducted in Rangpur, Bangladesh by Shah et al., (2015) only with Santal male respondents, where the mean (\pm SD) Nasal Height was significantly higher in Bangalees 5.0 (± 0.4) cm than the Santals 4.8 (± 0.4) cm ($p < 0.001$). The mean (\pm SD) nasal width (NW) was significantly higher in the Santals 3.8 (± 0.2) cm than the Bangalees 3.53 (± 0.2) cm ($p < 0.001$). Regarding mean (\pm SD) Nasal Index (NI) of the Santals 80.0 (± 7.2) was higher than the Bangalees 65.9 (± 6.3), which was statistically significant ($p < 0.001$). The findings of this study were like the present study.⁹

Another study conducted by Rahimi et al., (2019) on student of Shiraz University of Medical Sciences, Iran revealed that mean FL of both males and females were 12.7cm and 10.2 cm. FW of male and female were 13.2 cm and 11.2 cm respectively.¹⁰ Dodanghehet., al, (2018), reported that FH of male and female Irani student were

11.91 cm and 10.392 cm. And FW of male and female were 11.79 cm and 11.56 cm. These findings confirm the existence of sexual dimorphism in Iranian population.⁷ Shruti et al., (2019) reported mean FL of Haryanvi male and female were 121.43 mm and 115.68 mm. Mean FW of male and female Haryanvi people were 139.65 mm and 134.94 mm. According to above findings regarding facial parameters male had higher value than female, which is like this study.¹¹ Wai et al., 2014 conducted a study on Indian, Malay and Chinese student of University of Malayasia. The study revealed that gender difference of Malay, Chinese and Indian students are significant with higher value of male than female in all facial parameters.⁵

Rahimi et al., (2019) reported that mean NH of Iranian male and female were 3.2 cm and 3.2 cm. Mean NW of Iranian male, and female were 2.1 cm and 2.2 cm respectively. Mean NI of male and female Iranian students were 88.2 cm and 93.1 cm.¹⁰ Wai et al., (2014) conducted a study on Indian, Malay and Chinese student of University of Malayasia. The study revealed that gender difference of Malay, Chinese and Indian students are significant with higher value of male than female in all nasal parameters.⁵

The findings about Facial Length (FL), Facial Width (FW) and Facial Index (FI) of Santal of West Bengal described by Ghosh and Malik, et al., (2007) was quite dissimilar. In their study they found Mean (\pm SD) Facial Length (FL) of Santal male and female was 11.30 cm and 10.39 cm. Mean Facial Width (FW) of Santal male and female was 13.73 cm and 13.25 cm respectively. So, regarding facial parameter of Santal of West Bengal is higher than Santal and Bangalee of Northern area of Bangladesh.¹²

Regarding this study face type of most of the Bangalee and Santal respondents (male and female) were Hyperleptoprosopic (very tall, narrow face) face type. Only few of the Santal respondents were Leptoprosopic (tall, narrow) face type. Ghosh, and Malik, et al., (2007) reported that most of the Santal male of West Bengal were Euryprosopic (broad, short face) face type and most of the Santal female of West Bengal were Euryprosopic (very broad, short face) face type.¹²

Face types among the male respondents of both Santal (n= 74) and Bangalee (n= 75) ethnic group (n = 150) reveals that all (100%) the Santal male respondents had Hyperleptoprosopic (very tall, narrow) face type. All 100% the Bangalee male respondents had Hyperleptoprosopic (very tall, narrow) face type. No Chi-Square statistics were computed because facial type of the male respondents was constant (similar without any variation) in both ethnic groups. Face types among the female respondents of both Santal (n= 74) and Bangalee (n= 75) ethnic group (n = 150) reveals that among the Santal female maximum 84.2% had Hyperleptoprosopic (very tall, narrow) face type and among the Bangalee respondents all most all 98.7% had same Hyperleptoprosopic (very tall, narrow) face type also present. Leptoprosopic (tall, narrow) face type were higher proportionately present among Santal female than Bangalee female respondents (11.8% vs 1.3%

respectively). Mesoprosopic (average) face type only present among the Santal female respondents (SantalvsBangalee = 3.9% vs 0.0 %). The relation between variables were statistically significant ($p < 0.05$).

In a study face type of Santal respondents of West Bengal according to their sex (27.3%) male and (40.3%) female respondents had Hypereuryprosopic (very broad, short) face type, about (36.0%) male and (31.5 %) female had Euryprosopic (broad, short) type of face. (10.5 %) Male and (8.2 %) female had Leptoprosopic (tall, narrow) face type and very least proportion male (2.7%) & female (2.4%) had Hyperleptoprosopic (very tall, narrow) face.¹² This study findings were quite dissimilar with the present study regarding the types of faces among the Santal respondents.

Dodanghehet., al, (2018), reported that most frequent face type among Iranian student were Hyperleptoprosopic (very tall, narrow) face type.¹³ Rahimi, et al., (2019) also found that most frequent Iranian face type were Hyperleptoprosopic (very tall, narrow) 72% type.¹⁰ A similar study by Heidari et al., 2009 revealed that most frequent Iranian (Sistani and Baluch groups) face type was Leptoprosopic (tall, narrow) type of face. Shruti Gupta¹¹ et al., 2019, found Mesoprosopic (average) type of face was predominant face type in both male and female Haryanvi population.⁹ Wai et al., 2014 found Indian and Malay students of University of Malaysia had Leptoprosopic (tall, narrow) type of face whereas Chinese student had Mesoprosopic (average) type of face.⁵

A study done by Ghosh. and Malik, (2007) was observed that on the basis of Nasal Index, 57.0% Santal respondents of West Bengal were Mesorrhine (medium), 28.1% were Platyrhine (broad and flat), 2.3% were Hyperplatyrhine (excessively broad and flat) and 0.9% Hyperleptorrhine (excessively tall and narrow) types of noses. Regarding predominant nasal type among the Santal respondents in both the studies were almost similar findings that Mesorrhine or medium shaped nose was present in Santal.¹²

In another study, most of the Santals belonged to the Mesorrhine (medium) 72% followed by Platyrhine or broad nose (19%), whereas the Bengalee had Leptorrhine or tall and narrow nose (72%) followed by Mesorrhine or medium nose (24%). Similar Mesorrhine nose was found in Santal of Rangpur Area. Regarding predominant Mesorrhine (medium) nasal type among the male Santal respondents all the studies showed almost similar findings.^{14,15}

Conclusion

On the basis of the results of this study, most common type of face in both ethnic group respondents of Northern area of Bangladesh was Hyperleptoprosopic. Leptorrhine type was predominant nasal type among the Bangalee respondents and Mesorrhine and Platyrhine type were predominant nasal type present among the Santal. Comparison of difference of the mean of all nasofacial

anthropometric parameters between Santal and Bangalee respondents were statistically significant. Value difference like mean in respect of Ethnic dimorphism, as well as sexual dimorphism nasofacial anthropometry between Santal and Bangalee respondents were statistically significant. Findings of this study will help to build database for nasofacial, maxillofacial, cosmetic surgeons & orthodontist which help them in making diagnosis of congenital and traumatic nasofacial anomalies & planning their reconstructive surgeries. The findings of the study may also help forensic experts in identifying the victims and assailants of criminal cases.

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Common Health Problems among Geriatric Patients Attended in Dhaka Medical College Hospital, Bangladesh

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Abstract

Background: The average life expectancy in the world is increasing dramatically for quite a few years. Over 13 million people in Bangladesh are over 60 years old as of 2019, accounting for 8% of the country's overall population. Health care among these groups of people is not very much concerned yet especially about non communicable diseases which are increasing globally day by day. This study aimed to find out the common health problems among the geriatric patients attended in Dhaka Medical College Hospital, Bangladesh.

Objective: The objective of the study was to find out the common health problems among geriatric patients admitted in Dhaka Medical College Hospital.

Methods: This descriptive type of cross-sectional study was conducted among 149 patients of the outdoor and indoor departments of Dhaka Medical College Hospital, aged 60 years and above during the period from November 2021 to April 2022. Data were collected through face-to-face interviews using a pretested semi- structured questionnaire. The questionnaire included socio-demographic data and status of common health problems among elderly population. Then data were cleaned checked and analyzed according to objective.

Results: The survey revealed that 83.22% of respondents were 60-70 years old. Maximum respondents were illiterate (40.27%) and came from rural areas (71.14%). Approximate 57.72% of sons were principal earning members and 36% of sons were the principal caregivers of the respondents. Fifty-one percent of geriatric patients (both male and female) had hypertension, visual impairment 48.3%, joint pain 45% and diabetes mellitus 35%. Most importantly, the proportion of female patients was more who suffered from hypertension (57%), visual impairment (53%), diabetes mellitus (42%), cardiovascular diseases, and memory loss. Joint pain was found in the same proportion both in males and females. Male suffered more from respiratory diseases, hearing problems, and COVID-19 than females.

Conclusion: This study showed a significant proportion of the geriatric patients suffered from different types of non-communicable diseases such as hypertension, visual impairment, diabetes mellitus, joint pain, respiratory diseases, etc. It is therefore demands more attention to be paid in making geriatric people-focused health care services at all levels.

Keywords: Geriatric Patients, Older People, Bangladeshi geriatric people, Common Health Problems.

Introduction

In just 15 years, the number of older people is expected to rise by more than 60%-by 2030, there will be around 1

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billion older people worldwide, accounting for 12% of the overall population. In the next 20 years, the proportion of older people will continue to rise: by 2050, there will be 1.6 billion older individuals on the planet, accounting for 16.7% of the total population of 9.4 billion people. Between 2015 and 2050, this equates to a 27.1 million rise in the number of persons aged 65 and more on an annual basis¹. Over 13 million persons in Bangladesh are over 60 years old as of 2019, accounting for 8% of the country's overall population. With 36 million people over the age of 60, the proportion of senior persons is predicted to become 21.9 percent in 2050. This indicates that one out of every five Bangladeshis will be beyond the age of 65. The need for health care grows as the population ages. Due to the aging of the immune system, older people suffer from both degenerative and communicable diseases. Infections are the primary cause of morbidity, with vision impairment, difficulties walking, chewing, hearing, osteoporosis, arthritis, and incontinence rounding out the list.

In 2018, Bangladesh was ranked 136th out of 189 countries in the United Nations Human Development Index. In

Bangladesh, hardly a third of those over the statutory pensionable age (33.4 percent) get an old-age pension (contributory, noncontributory or both). With the old-age dependence ratio predicted to increase in the next few decades, there will be fewer and fewer working-age people to give economic support throughout old age². The average life expectancy in the world is increasing dramatically for quite a few years. Likewise, the health problems related to aging such as visual impairment, hearing impairment, diabetes mellitus, hypertension, cardiovascular diseases, chronic respiratory diseases etc. are also increasing. Old people who are suffering from these health conditions need special attention. The following review of the literature estimates the common health problems of the elderly in Bangladesh and explores the difference in morbidity between gender and urban-rural distributions. The health problems related to aging have been on the rise in the world for the past few decades. At this time the share of the population aged 60 years and over will increase from 1 billion in 2020 to 1.4 billion. By 2050, the world's populations of people aged 60 years and older will double (2.1 billion). The number of persons aged 80 years or older is expected to triple between 2020 and 2050 to reach 426 million.³

The population in South-East Asia Region is ageing rapidly. While the proportion of people aged 60 or above was 9.8% in 2017, it will be increased to 13.7% and 20.3% by 2030 and by 2050, respectively⁴. Bangladesh is no exception in this regard. 7.9% of the population of Bangladesh is aged 60 and above, with males accounting for 8.2% and females 7.7%.⁵

As ours is a developing country, the health sector often fails to ensure equitable distribution and accessibility of ideal health care to the elderly population due to various limitations⁶.

Bangladesh, with one of the highest population densities (985/km sq) in the world, is projected to experience dramatic growth in the absolute number of its population aged 60 years or older from the current level of approximately 7 million to 14 million by 2020. Very little is known about the health of the aged and its problems in Bangladesh.⁷

Health problems of the geriatric population of Bangladesh are of great concern because of increase in longevity will lead to an increased number of old people in Bangladesh. According to the demographic cycle, Bangladesh will soon have a population where the highest proportion lies in the age range of above 60. This proportion of the population will be dependent. Pain characteristics as well as any association with changes in physical performance in community-dwelling older adults are a common problem

in Bangladesh. To combat this problem adequate health care is a must.⁸ The morbidity and mortality pattern of geriatric people associated with a group of some common health deviations make health problems of the elderly a public health concern, the prevalence of which generally differs in different countries and within various regions of a country depending upon the social, economic, racial and environmental factor.⁹

These study findings can be used to assess the proportion of common health problems among the geriatric population to provide adequate and appropriate medical support. Estimation of health problems of the elderly in developing countries are required from time to time to predict trends in disease burden and plan health care for the elderly. Early diagnosis of the geriatric problems by screening in order to reduce the cost of treatment, complications and the severity of the disease, reduce morbidity and mortality. Age-induced changes in the physique of the geriatric population result in decreased mobility of their joints, often accompanied by decreased bone strength and other anabolic & neurologic processes that weaken their locomotor strength in general. Their diet is often not tailored to this altered requirement due to a lack of nutritional awareness and variable degrees of negligence from younger family members, perpetuating the deficiencies and causing further weakening of their loco-motor processes.¹⁰

This study was aimed to explore the common health problems present among the elderly people along with their socio-demographic characteristics attended at the out-patient and in-patient department of Dhaka Medical College Hospital from all areas in Bangladesh.

Materials and Methods

This descriptive type of cross-sectional study was conducted among 149 purposively selected patients at the outdoor and indoor departments of Dhaka Medical College Hospital for the period of 6 months (November 2021 to April 2022). Both male and female geriatric patients (aged 60 years and above) were included in this study. After taking informed written consent, data were collected through face-to-face interviews using a pretested semi-structured questionnaire. The questionnaire included socio-demographic data and status of common health problems among elderly population. Then data were cleaned checked and analyzed according to objective by using Microsoft Excel 2019 software.

Results

After analysis the results were presented by following tables, graphs and charts:

Table 1: Socio-demographic characteristics of geriatric patients (n=149)

Attributes	Frequency	Percentage
Age of the patients		
60- 70	124	83.22
70- 80	22	14.77
80- 90	3	2.01
Gender		
Male	75	50.33
Female	74	49.67
Area of residence		
Rural	106	71.14
Urban	43	28.86
Level of education		
Illiterate	60	40.27
Primary	54	36.24
Secondary	19	12.75
Higher secondary	12	8.05
Graduate	3	2.01
Post graduate	1	0.67
Principal earning members		
Respondent	32	21.48
Son	86	57.72
Spouse	19	12.75
Daughter	6	4.02
Others	6	4.02

Table 1 shows that, 83.22% respondents were 60-70 years age group and 50.33% were male. About 71.14% lived in rural area and 40.27% were illiterate.

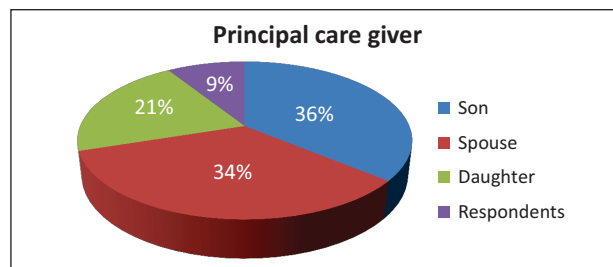
**Figure 1:** Principal care giver at families of respondent (n=149)

Figure 1 shows that in 36% cases son is the principal caregiver and 34% were dependent on their spouse.

Table 2: Proportion of common health problems among geriatric patients (n=149*)

Health problems	Frequency	Percentage
CVD	29	19.5
Respiratory diseases	48	32.2
HTN	76	51
DM	52	35
Dementia	24	16.1
Joint pain	67	45
Visual impairment	72	48.3
Hearing problems	21	14.1
Covid-19	13	8.7
Cancer	2	1.3

*= Multiple answer
CVD= Cardiovascular diseases. HTN= Hypertension, DM= Diabetes Mellitus

Table 2 shows that 19.5% patients had CVD, 32.2% had respiratory diseases, 48% had visual impairment and only 1.3% had cancer.

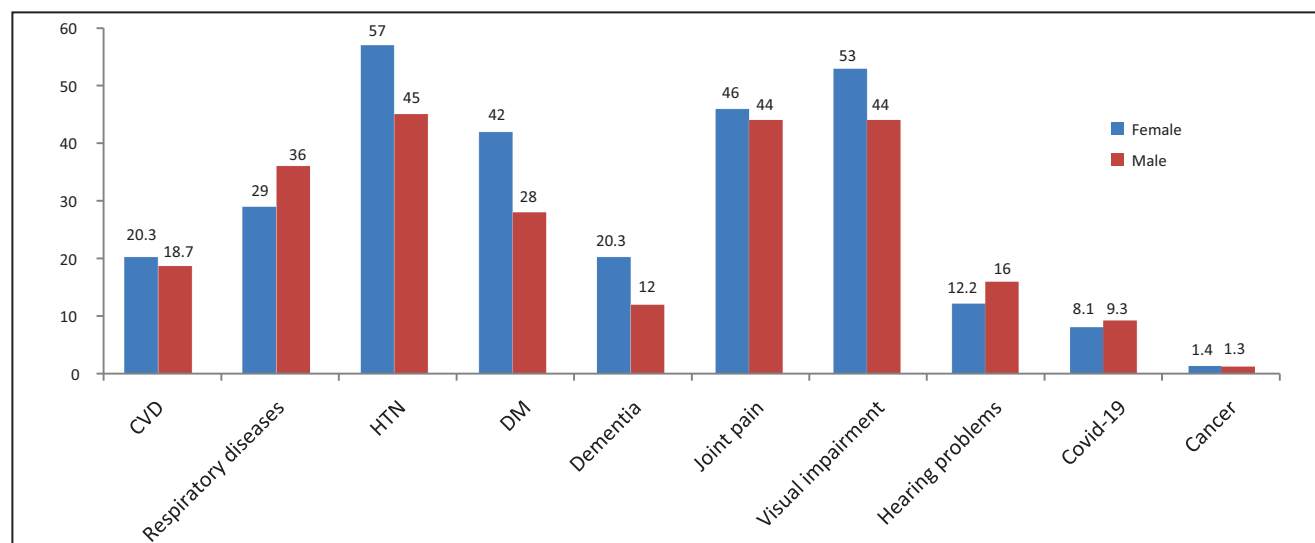
**Figure 2:** Comparison of common health problems among male and female geriatric patients (n= 149)

Figure 02 shows that females suffer more from CVD, HTN, DM, Dementia, visual impairment and cancer. On the other hand male suffer more in respiratory diseases, hearing problems and covid-19

Discussion

Bangladesh, with one of the highest population densities (985/ square km) in the world, is projected to experience a dramatic growth in the absolute number of its population aged 60 years or older from the current level of approximately 7 million to 14 million by 2020. Very little is known about the health of the aged and its problems in Bangladesh⁷. Data were collected from 75 male and 74 female respondents most (83.22%) of the respondents were 60-70 years age group, 14.77% respondents were 70-80 years age group and only 2.01% of the respondents were in 80-90 years age group. According to a cross sectional study conducted by Canadian Institute of Health Information, estimated from 2017 shows that 17% of Canada's population was aged 65 & older.¹¹

The current study revealed that the majority of the respondents resided in rural area (71.14%), and rest 29.86% resided in urban area. These findings showed that illiterate patients from rural area came more in Government hospitals.

This study showed that most of the respondents were illiterate (40.27%), followed by Primary School (36.24%), Secondary School (12.75%), Higher Secondary (8%), Graduate (2%) and Postgraduate or Higher (1%). Demographic characteristics of participants enrolled from the elderly health examination programme in Taipei, 2013-2015 showed, there were mostly older men in Taipei with no less than 16 years of education (36.4%). In addition, 19.3% of the men fell in the education level category of no more than six years, 10.0% in the category of 7-9 years, 22.5% in the category of 10-12 years, and 11.8% in the category of 13-15 years. In contrast, there were mostly older women with no more than six years of education (36.2%), with 16.2% having 7-9 years, 23.8% having 10-12 years, 9.0% having 13-15 years, and only 14.8% having no less than 16 years of education.¹²

It is found that the maximum occupation of the male respondents (27%) were farmer, followed by businessmen (24%), retired (19%), service holder (17%), labourer (6.7%) and others (6.7%). Most of the female respondents (95%) were homemaker, 2.7% farmer and others were 2.7%. A cohort study showed both men and women with lower income status occupied a small proportion of all participants; 3.1% of men and 1.9% of women were from lower-income households which was very similar to our study.¹²

This study illustrated that in more than half of the families of the respondents (58%) son was the principal earning member. Respondent own is the principal earning member in 21% families. Spouse of the respondent is the main

earning person in 13% families, daughter in 4% families and others in 5% families. This is a common cultural context of Bangladesh. Most of the cases (36%) son was the principal caregiver to the respondents and the spouse, in 34% families, followed by the daughter in 21% families. In 9% families, the respondent own is the principal caregiver. We can see principal caregiver was a vital factor for geriatric patients.

This study demonstrates that among several geriatric health problems, hypertension was present in more than half of the elderly people (51%) which was the highest proportion. A cross-sectional study conducted in India among senior citizens, 42.7 % people accounted for hypertension and diabetes mellitus.¹³ We should give more focus on these non-communicable diseases for betterment of health of geriatric people. We also found that irrespective of gender visual impairment was the next issue of concern which was found in 48.3% respondents. A cross sectional study in Lucknow among senior citizens, 93.3% were suffering from vision problem in left side of the eyes followed by 136 people (90.7%) had been suffering from vision problem in right side of the eye, 84 (56.0%) had been suffering from hearing problems in the left side of the ear, 81 (54.0%) had been suffering from hearing problems in right side of the ear¹³ and joint problems in 45% cases. About 65.5 % of the respondents in a sample of 226 elderly people in Sreepur Upazilla of Gazipur, Bangladesh were found to be suffering from joint pain that resembles to our study.⁷

Diabetes mellitus was present in more than one third (35%) of the elderly that sounds alarming. About 25 % people over age 60 years were living with diabetes mellitus according to another cross sectional study conducted in outpatient department of Dhaka Medical College that shows diabetes mellitus is a common health problem of our country.⁸

Respiratory diseases were also found in almost one third (32.2%) patients in our study. According to a retrospective study conducted by the Department of Respiratory Medicine, Dhaka Medical College Hospital, Community acquired pneumonia was observed in 65.6% elderly, chronic obstructive pulmonary disease in 20.7%, bronchitis in 8.2%, hospital acquired pneumonia in 5.5 % elderly people.¹⁴ Only 1.3% of the respondents were diagnosed with cancer. One study of a private cancer hospital in Bangladesh showed the prevalence of geriatric cancer is about 33.77%⁹. COVID-19 was also found to be tested positive in 8.7% cases. In case of hypertension female respondents had a greater proportion (57%) than that of male respondents (45%). Female respondents also had more proportion of diabetes mellitus (42%) when compared to male respondents (28%). Another study conducted throughout the outdoors of randomly selected hospitals of Dhaka city on 300 patients aged 65 or above established the fact that prevalence of hypertension, diabetes mellitus and ischemic heart disease was found

more in men.⁶ The scenario was quite opposite in our study. Male respondents informed to have respiratory diseases in 36% of cases which is more than females (29%). Visual impairment was found in 53% of females and 44% of males. Joint pain was almost in same proportion. About 18.7% male and 20.3% female were suffering from cardio-vascular diseases. Hearing problems were more frequent in males (16%) than females (12.2%). Females faced memory loss problems more frequently (20.3%) than males (12%). COVID-19 had a slightly higher prevalence in males (9.3%) than in females (8.1%). Cancer was rare in both sexes with an almost the same percentage but very slightly higher in females (1.4%) than males (1.3%). A study on 6492 new cancer patients was done at the National Institute of Cancer Research & Hospital (NICRH), Mohakhali, Dhaka from January 2006 to December 2006 showed, in adult males Lung cancer ranked at the top (909, 24.1%) followed by cancer of lymph node and lymphatic (264, 7.0%), Laryngeal carcinoma (247, 6.5%) and Esophageal Carcinoma (199, 5.3%). Breast cancer (24.48) was the major malignancy amongst adult females (633, 23.3%) followed by that of the cervix (583, 21.4%), Lung (153, 5.6%) and Oral cavity (116, 4.3%).⁹ Limitations in this study were firstly the sample size due to COVID-19 situations. Secondly, it was a purposive sampling method. Thirdly, data were collected on the basis of patient's statement having the chance of recall bias.

Conclusion

In spite of the various limitations, the study revealed the different common diseases among elderly population. As life expectancy is increasing day by day it is a major concern to detect the geriatric problems and take immediate and appropriate action to resolve those.

Conflict of interest: No

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Morphometric Study of Length of Intertrochanteric Line and Intertrochanteric Crest of Femur in Bangladeshi Population

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Abstract

Background: Intertrochanteric line and Intertrochanteric crest are important features of the proximal femur provide attachment sites for some muscles and ligaments and holds great clinical significance.

Objectives: The aim of our study is to measure & describe the various morphometric parameters that can throw further light on the existing data. It can serve as a guideline for designing better matched prostheses and implants for hip surgeries in the Bangladeshi population.

Methods: This cross-sectional, descriptive type of study was performed in Department of Anatomy, Mymensingh Medical College, Mymensingh, from January 2019 to December 2019 on 150 dry femora. Sample collection was done by purposive sampling technique. Any damaged, incompletely ossified and fractured bones were excluded. Data were statistically analyzed by using SPSS software, version 27.

Results: The mean(\pm SD) length of intertrochanteric line of right and left femur was 60.02 (\pm 6.32) mm and 60.49 (\pm 7.16) mm. The mean(\pm SD) length of intertrochanteric crest of right and left femur was 52.66 (\pm 5.30) mm and 50.09(\pm 5.91) mm. respectively.

Key word: Morphometry Length, Intertrochanteric Line, Intertrochanteric Crest

Introduction

The femur is the longest and strongest bone in the human body. It is morphologically typical long bone, approximately one-fourth of the height of the individual and transmits weight to the tibia. The femur consists of a shaft and two ends, proximal and distal. The proximal end of the femur consists of a head, neck, greater and lesser trochanters. Head articulate with the acetabulum, interrupted postero-inferior to its center by a small, rough fovea or pit. The head is attached to the femoral shaft by the neck, which is approximately 5 cm long. Its anterior surface is intracapsular, the capsular ligament extends laterally

attaching to the intertrochanteric line. On the posterior surface the capsule does not reach the intertrochanteric crest, little more than the medial half of the neck is intracapsular.¹

The site where the neck joins the body anteriorly is indicated by the intertrochanteric line, a roughened ridge running from the greater to the lesser trochanter. A similar but smoother ridge, the intertrochanteric crest, joins the trochanters posteriorly. A little above its center there is a low, rounded elevation on the crest is the quadrate tubercle. It is important and indispensable to know the morphometric characteristics of these, with the intent of minimizing the risk of complications related to surgical procedures executed in the area due to vascular, traumatic or metabolic causes, and to achieve an alignment of prosthesis to be implanted.²

Morphometric studies of the intertrochanteric line and intertrochanteric crest were performed in different populations and communities. But the data obtained from these studies demonstrated that femoral morphometry had regional features and social differences which will be helpful for future study.

Materials and Methods

This study was carried out on 150 fully ossified dry human femora, which were collected from 1st year MBBS students and Department of Anatomy of Mymensingh Medical College, Mymensingh. Within 150 femora, 64 belong to right side and 86 belong to left. It was conducted from January to December 2019.

Only fully ossified, dried and thoroughly cleaned femora were included in the study while the femora which were damaged and those having any deformity or pathology

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were excluded from the study. All parameters were measured by using digital Vernier calipers in millimeters. Data was made analysis using SPSS version 27 and mean values presented in tables.

Operational Definitions:

Length of intertrochanteric line: The distance along a straight line from the highest point of greater trochanter to

the lowermost point at the level of base of lesser trochanter anteriorly.

Length of intertrochanteric crest: The distance from the postero-superior point of the greater trochanter to the root of lesser trochanter posteriorly.

Procedure:

The intertrochanteric line was measured by placing fixed jaw of digital slide calipers on the highest point of greater trochanter and the sliding jaw on the highest point of the lesser trochanter. Then the distance between them was measured by digital slide calipers and expressed in mm. The intertrochanteric crest was measured by placing the fixed jaw of digital slide calipers on the postero-superior angle of greater trochanter and the sliding jaw was placed on the base of the lesser trochanter. Then the distance between them was measured by digital slide calipers and expressed in mm.



Figure1: Procedure of Measurement of Length of Intertrochanteric line of femur



Figure 2: Procedure of Measurement of Length of Intertrochanteric Crest of femur.

Results

As shown in table 1, the length of intertrochanteric line on the right and left side varied from 46.34-75.61 mm with the average 60.02 ± 6.32 mm and 48.87-76.18 mm with the average 60.49 ± 7.16 mm respectively.

Table-1: Distribution of Length measurement in mm of intertrochanteric line and intertrochanteric crest of femur within the study sample (n=150)

Measurement in mm	Side	Side Frequency (No of sample)		Range (mm)	
		Maximum	Minimum	Maximum	Minimum
Length of intertrochanteric line	Right (n=150)	(15.63) (%)	(1.56) (%)	75.61 Mean (mm)=60.02 \pm SD (mm)=6.32	46.34 Mean (mm)=60.02 \pm SD (mm)=6.32
	Left (n=150)	(11.63) (%)	(1.16) (%)	76.18 Mean (mm)=60.49 \pm SD (mm)=7.16	48.87 Mean (mm)=60.49 \pm SD (mm)=7.16
Length of intertrochanteric crest	Right (n=150)	(23.44) (%)	(1.56) (%)	67.44 Mean (mm)=52.66 \pm SD (mm)=5.30	42.12 Mean (mm)=52.66 \pm SD (mm)=5.30
	Left (n=150)	(16.28) (%)	(1.16) (%)	63.35 Mean (mm)=50.09 \pm SD (mm)=5.91	39.70 Mean (mm)=50.09 \pm SD (mm)=5.91

Similarly in table 1, the length of intertrochanteric crest was found to be varied from 42.12-67.44mm with average distances 52.66 ± 5.30 mm and from 39.70-63.35mm with average distances 50.09 ± 5.91 mm on right and left side respectively.

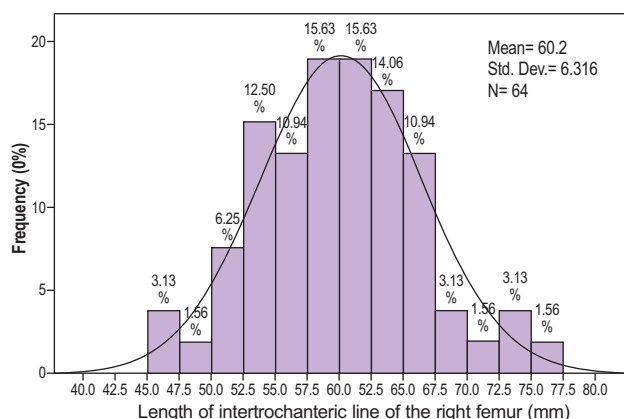


Figure 3: Histogram Showing the Frequency Distribution of Length of Intertrochanteric Line on Right Side

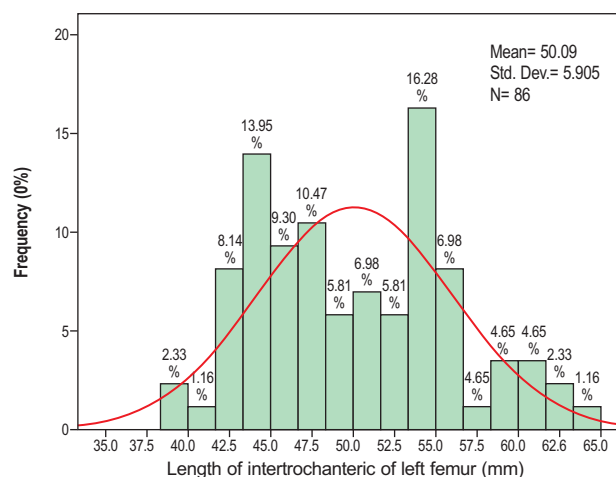


Figure 6: Histogram Showing the Frequency Distribution of Length of Intertrochanteric Crest on Left Side

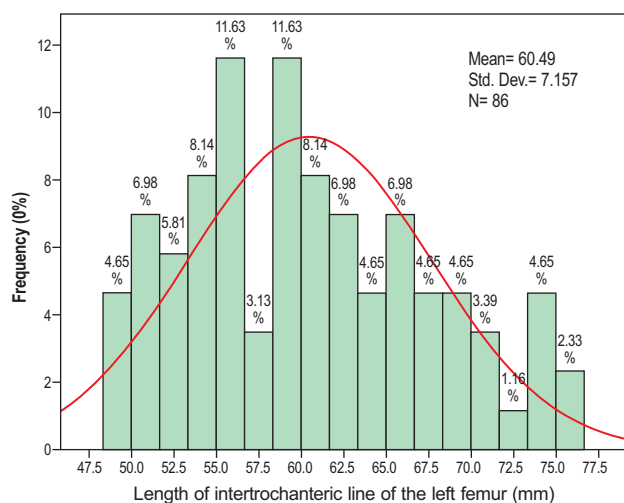


Figure 4: Histogram Showing the Frequency Distribution of Length of Intertrochanteric Line on Left Side

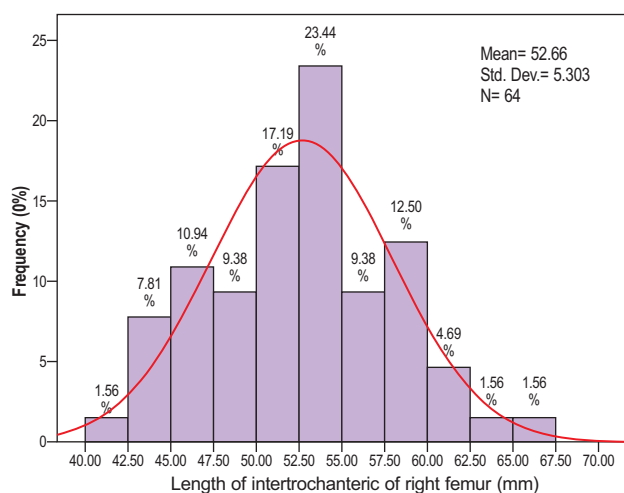


Figure 5: Histogram Showing the Frequency Distribution of Length of Intertrochanteric Crest on Right Side

Discussion

According to the present study, the mean (\pm SD) length of intertrochanteric line on right femur was 60.02 (\pm 6.32) mm and on left femur was 60.49 (\pm 7.16) mm and the mean (\pm SD) length of intertrochanteric crest was 52.66 (\pm 5.30) mm for right femur and 50.09 (\pm 5.91) mm for left femur. Caiaffo et al. conducted a study on 120 (58 from male and 62 from female cadavers) femora and found the mean (\pm SD) length of intertrochanteric line in male as 66.46 \pm 0.59 mm and in female as 60.80 \pm 0.42 mm.³ Menezes et al. studied on 29 (11 right and 18 left) dry human femora and found the mean (\pm SD) length of intertrochanteric line as 47.9 \pm 6.2 mm.² Khanal, Shah & Koirala (2017) carried out a study on 60 (30 right and 30 left) femora and found the mean (\pm SD) length of intertrochanteric crest as 50.4 \pm 7.1 cm, on right and left sides were 49.8 \pm 6.6 mm and 51.0 \pm 7.4 mm respectively.⁴ Singh et al. (2013) estimated the length of 200 femora and found the mean (\pm SD) length of intertrochanteric crest as 58.1 \pm 4.7 mm.⁵ The mean value of present study regarding length of intertrochanteric line was nearly similar to the value described by the Caiaffo et al. But the findings were higher than those of Menezes et al. The mean value of present study regarding length of intertrochanteric crest in case of right side was higher, but in case of left side, it was nearly similar to the value described by the Khanal, Shah & Koirala but the lower than those of Singh et al.

Conclusion

The results of the present study of 150 femora revealed that length of intertrochanteric line & intertrochanteric crest were almost similar on right and left side. Though there is a limitation of study about morphometry of proximal part of femur in Bangladeshi population, this study of the dimensions of intertrochanteric line & intertrochanteric crest will help the radiologists to interpret and identified the location of fracture & their clinical significance. These

various femoral dimensions obtained in this study will also be helpful for future researcher.

Conflict of interest: No

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Pre-analytical Variables: A Potential Source of Laboratory Error

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Abstract

Clinical laboratories have a great role in the management of patients. To ensure quality test results laboratories need to maintain standards in all the three phase of total testing process- pre analytical, analytical and post-analytical. With the advancement of modern technologies analytical and post-analytical errors have been reduced significantly but pre-analytical errors are still very common, which can be as high as 71% of total error rate. This is because; many of the steps in this phase are related to human activities and outside of the laboratories that are not under the direct control of laboratory. Pre-analytical errors can occur during test ordering by the physicians, patient preparation, sample collection, transportation or during processing of the sample. Though most of the errors in this phase remain within the reference limit but 25% can produce erroneous results that can affect patient health. In order to minimize errors in this phase it is mandatory to check and identify the sources of pre-analytical errors.

Key words: Pre-analytical variables, Laboratory error, Interference

Introduction

Laboratory test results play very important role in the clinical decision making process. Any errors in the test results have serious consequences in terms of diagnosis, treatment and prognosis of the patients. With the increasing number of laboratory tests day by day, the opportunity of error also increases. These errors can occur in any of the three phases of total testing process: the pre-analytic, analytic and post analytic phases. This process begins as the clinician determines the need for a laboratory test and ends with the interpretation of test results. The paper highlights errors in various steps of pre-analytical phases, sources of pre-analytical variation and its impact on patient's health.

Pre-analytical phase

Pre-analytical phase extends from the time of test ordering by the clinician until the sample is ready for analysis. With the advancement of the instrument technology and automation, analytical error rate has been reduced remarkably but the pre-analytical phase remains the most vulnerable part of the total testing process. Pre-analytical error may occur at any step of this phase- like during test

requesting, patient preparation, sample collection, sample transport, handling and storage.¹ Some of these steps are performed outside the laboratory and are not under the direct supervision of laboratory staff. These wide ranges of activities, location and personnel involved in this phase increase the chance of error to occur. According to some study pre-analytical error accounts for 46%–71% of all the errors occurring in the laboratory services.^{2,3} A clear understanding about the sequence of events in laboratory testing is essential to identify the sources of pre-analytical error.

Sources of pre-analytical variation are as follows:

- A) Test order: Errors in the laboratory order commonly occurs due to-
 - Inappropriate laboratory test requisition which may originate from similarities of the test name or improper use of synonyms.
 - Incomplete laboratory request form also can contribute to the laboratory error especially for the tests that require additional clinical information.
 - Incomplete entry of orders into the hospital electronic computer system.
 - Transcription entry error occurs where orders are manually transcribed from written notes or requisition, such as outpatient location or specimen receiving section. Also, physicians sometimes verbally dictate their test orders to interns or nursing staffs who transcribe the tests onto requisition form. College of American Pathologists (CAP) Q-probes studied upon 660 institutes and estimated that 4.8% of physician requests were associated with one or more data entry errors.⁴ In a single centered study done in Australia it was found that 75% of total laboratory error were caused by transcription error which ultimately led to wrong test or missing test.⁵

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B) Patient preparation: After placing a correct order, patient must be prepared for the specific test so that results can be properly interpreted. There are many factors regarding patient that can affect the test results.

- Diet: Diet (number of meal, sources and proportion of a nutrient in diet, vegetarianism, starvation etc) is well known variable that can affect plasma composition. There are both long term and acute effects of diet on many analytes. After ingestion of cooked fish serum creatinine concentration increases significantly while eGFR decreases from the baseline value⁶. It also increases blood urea level. Now it is well known that a high calorie diet increases serum triglyceride level.⁷ Serum triglyceride and cholesterol level is also influenced by physical activity, smoking, consumption of alcohol and coffee.⁸ Moreover, activity of some enzymes like ALT, AST, and ALP may also increase up to 20% following a meal.

- Fluid intake: Intake of various fluid may also exert acute and chronic effect. Caffeine which is found in tea & coffee increases plasma glucose concentration by increasing free cortisol level. It also induces diuresis with loss of electrolytes through urine. Urinary loss of water and electrolytes specially calcium and magnesium increases within 2 hours after caffeine ingestion.⁹ Caffeine also increases lipid catabolism thus increases the plasma total cholesterol, low-density lipoprotein cholesterol and high-density lipoprotein cholesterol.¹⁰ Another important factor is alcohol that markedly affect the concentration of some analytes depending on the duration and extent of its consumption. Plasma glucose decreases and lactate increases significantly after consumption of alcohol.¹¹ Alcohol also stimulate hepatic uric acid synthesis by enhancing adenine nucleotide degradation thus increasing plasma uric acid level.¹² Chronic alcohol ingestion is associated with an increase in serum GGT, AST & ALT level. Serum ferritin level also increases in chronic alcoholism.¹³⁻¹⁵

- Tobacco smoking: Smoking leads to a number of acute and chronic changes in some analyte concentration. Glucose concentration dramatically rises by 10 mg/dl after 10 minutes of smoking a single cigarette and it can persist for one hour. Current smokers also showed high fasting and post prandial plasma glucose concentration than ex-smokers or non-smokers.^{16,17} Smoking also leads to acute increase in serum triglyceride, LDL and total cholesterol concentration whereas it decreases plasma HDL cholesterol.¹⁸⁻²⁰ Heavy smokers have high level of liver enzymes in plasma but low total plasma protein and albumin.^{21,22} Smoking tobacco also have chronic effect on leukocyte count, some tumor marker, vitamins, heavy metals etc.

- Muscular activity: Physical activity also affects several plasma analytes. They are markedly influenced by the type, intensity and duration of exercise, level of training and time of recovery after training.²³ Simply, repeated clenching of fist during venous blood collection may increase the plasma potassium concentration by 1-2 mmol/L.²⁴ Intensive exercise transiently increases many common biochemical markers like cardiac biomarkers, markers of muscle damage. Exercise greater than 12 hours per week may increase plasma CK-MB & LDH. After bicycle stress test cardiac troponin also rises.²⁵⁻²⁷ It should be remembered that in case of professional sportsman a large proportion of laboratory results may fall outside the usual reference range to avoid the misinterpretation.

- Influence of circadian rhythm: Several hormones and other analytes tend to change in plasma concentration throughout the course of the day due to various reason. Some of them may vary up to maximum 30%.²⁸ It is well known that serum cortisol level increases in the morning than decline throughout the day. Serum potassium and iron levels are also found to be high in the morning than the evening.^{29,30}

- Menstrual cycle: Analytes can show significant changes due to the hormonal fluctuations during the menstrual cycle. Aldosterone could be high as twice just before ovulation while plasma cholesterol decreases during ovulation. Plasma iron and phosphate level decreases during menstruation.³¹

- Influence of therapeutic procedures: Several therapeutic procedures like- infusions & transfusions, dialysis and ionizing radiation have significant effect on laboratory tests. To ensure maximum quality the exact time regarding procedure should be documented and interpretation must be done accordingly.

C) Specimen collection: Once the patient is appropriately prepared for the test, a proper specimen must be collected at a suitable time. During specimen collection there are many small steps which can be a source of wrong test results.

- Patient identification: It is mandatory before any specimen collection. The Joint Commission recommends the use of two unique identifiers to confirm the identity of a patient.³²

- Body position of patient during sample collection: Body posture influences blood constituents. Changing posture from supine to upright position may lead to increase in serum albumin, total protein, ALP, GGT, LDH, total bilirubin, triglyceride level by more than 10%.³³

- Labeling of the container: Wrong labeling of the

sample is another area of pre-analytical error that ultimately warrant to recollect the specimen.

- Tube type or order of draw: There are a number of tubes available for specimen collection. Some of them contain additives or clot activator, other contain preservative or anticoagulant. Color of the stopper indicates different types of additives each poses specific test limitations. Collection of specimen in the correct tube is mandatory. False hyperkalemia or hypocalcemia may be seen when blood is collected in potassium EDTA tube.^{34,35} During collecting multiple specimens proper order should be maintained to avoid cross contamination. Wrong order of tube used for specimen collection can lead to further pre-analytical error.
 - Prolonged use of tourniquet: Use of a tourniquet for over 1-3 minutes can cause elevation in protein, calcium and potassium. After 5 minute total calcium level rises significantly.³⁶
 - Collection from IV line or catheter: Collection of specimen from a IV line results indilution effect for most of the analytes.³⁷ It also can cause contamination and hemolysis of the samples.³⁸
 - Inadequate tube filling: Inadequate or incomplete tube filling specially in vacuum tube where vacuum may persist causes micro hemolysis and affect some test results.³⁹
- D) Transportation, processing and storage of sample: After collection of specimen it should be transported and processed as soon as possible. Transportation is a major part of pre-analytical phase & can be crucial in delaying laboratory results.⁴⁰ If transport to a referral laboratory take longer time, then serum should be separated & the temperature should be maintained because in room temperature many analytes are unstable in unprocessed blood.⁴¹ After receiving specimen in the laboratory it should be centrifuged and serum or plasma are separated. Centrifugation must be done only once because re-centrifugation can release cellular components. Laboratory should seek to process blood by centrifugation within 30 to 60 minute of collection and stored at 4°C in the refrigerator until analysis. If longer storage is required, then serum is stored at -20°C with maintaining the temperature. Whole blood should not be stored in the refrigerator rather it should be preserved in room temperature if centrifugation is delayed. Prolonged storage of sample leads to alterations in the concentration of analytes.⁴²
- E) Noncontrollable variables: There are some biological factors that cannot be avoided rather they should be considered during the interpretation of results. Due to changes during growth and development reference ranges differ with respect of an individual's age and gender. Some biological markers increase while others decrease within first two weeks of life. Some changes are significant during puberty. Gender differences are related to lower metabolic demand, decreased muscle mass etc.^{43,44}
- F) Interference factors: These factors interfere with the analytical procedure and alter the test results. Common interference factors are hemolysis, lipemia, icterus and drugs.
- Hemolysis: It is the most common pre-analytical error which can be as high as 3.8% of all the routine samples, accounting for 40% to 70% of all unsuitable specimen.^{45,46} Frequency of hemolysis largely depends on the collection facility, characteristics of patient population and type and skill of professional who is doing the phlebotomy. Highest hemolysis frequency has been found in samples from emergency department, pediatric department and internal medicine. Lowest frequency was found in outpatient phlebotomy center where trained phlebotomist draws the blood.^{47,48} Hemolysis can occur in vivo or in vitro though in vivo hemolysis is not common. In vitro hemolysis is mainly caused by the factors associated with collection of blood, whereas transportation, processing and storage of blood specimen account for a minority of cases. Most frequently found cause of specimen hemolysis is vigorously drawn blood through needle.⁴⁹ It affects the laboratory results by releasing the cell components into the sample. Grossly hemolyzed sample alter almost all the analytes. Clinically meaningful variations of AST, LDH and potassium can be observed in samples with mild or almost undetectable hemolysis by visual inspection.⁵⁰
 - Lipemia: It is the most common and important endogenous interference which affect laboratory results. Turbidity in lipemic sample is caused by the presence of large lipoprotein particles which may occur due to postprandial triglyceride increase, parenteral lipid infusion or some lipid disorder.⁵¹ Lipemia causes interference by light absorption & light scattering, volume depletion effect and partitioning effect.⁵² All the serum analytes are affected by lipemia at varying levels but it causes clinically significant interferences for phosphorus, creatinine, total protein, calcium and iron.⁵³⁻⁵⁵
 - Icterus: Increased bilirubin in serum interferes by two mechanism- spectrophotometric interference and chemical reaction. It interferes with numerous biochemical tests like enzymes (ALT, ALP), electrolytes, creatinine, total protein, cholesterol, triglyceride etc.^{52,56}
 - Drug interference: Drugs as exogenous substance can interfere by different mechanisms and influence test results. Most of the drugs invariably interfere with different analytes: either by falsely increasing

or decreasing the concentration or affecting the actual concentration. Some commonly prescribed antibiotics and analgesics interfere with analytes.g. cephalosporin can falsely elevate serum creatinine level after its intravenous administration, paracetamol can increase serum uric acid level.^{52,57,58}

Impact on patient health

It can be easily understood that the effect of pre-analytical errors on patient health can be dangerous in respect to misdiagnosis which may lead to unnecessary operative procedures, prolonged hospital stays or repetition of test. Though 75% errors can produce results within reference range that cannot be easily identified but 12.5% may have effect on patient management and another 12.5% produce wrong results that are so illogical to be considered clinically and are rejected.⁵⁹

Conclusion

Most of the errors in laboratory services occur in the pre-analytical phase; therefore, it is very important to identify them in order to prevent errors in test results. All the laboratory personnel should have adequate knowledge about each step of pre-analytical phase. Proper test ordering, ideal patient preparation, correct and adequate specimen collection, rapid processing and transportation of sample can reduce the pre-analytical error rate thus helps towards improved interpretations of test results.

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A Case of Metastatic Papillary Carcinoma with Occult Papillary Thyroid Carcinoma in a Young Male

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Abstract

Papillary thyroid carcinoma (PTC) accounts for about 80% of all thyroid malignancies. It tends to have a female preponderance and usually present in the 3rd to the 5th decades of life as a slow growing midline swelling. Cervical metastases are common, blood borne being rare. This case was a 25 year-old male who presented with cervical lymphadenopathy and was diagnosed initially by FNAC (Fine Needle Aspiration Cytology) as metastatic papillary carcinoma of cervical lymph node that was secondary to an occult papillary carcinoma of the thyroid. The patient underwent total thyroidectomy with bilateral neck node dissection and the specimen was sent for histopathology. Histopathologic diagnosis corresponded to that of the FNAC.

Keywords: Papillary thyroid carcinoma (PTC), Fine needle aspiration cytology (FNAC), Occult papillary carcinoma of thyroid, metastatic papillary carcinoma

Introduction

Papillary thyroid carcinoma (PTC) is the most common endocrine malignant neoplasm worldwide with an increasing record number of new cases every year. It represents the 8th most diagnosed cancer worldwide.^{1,2} In Bangladesh thyroid cancer incidence is 1,492, the death rate being 483.³ Papillary carcinomas are considered well-differentiated and are responsible for between 80-85% of all thyroid malignancies. The median age at presentation for papillary carcinoma is 50 years.⁴ The incidence of PTC is on the rise.⁵ The reasons are unclear but may reflect improvements of factors that contribute to earlier detection of the cancer.⁶ It is usually detected in the 3rd to the 5th decades of the patients' life, with the mean age of 40 years. The incidence of PTC increases with age, and women are more frequently affected than men, in ratios of 2:1 to 4:1.⁷ The only well-established environmental factor that is related to PTC development is a previous history of radiation exposure.⁸ Other suggested risk factors include pre-existing benign thyroid disease or having a family history of PTC.⁹ Fine needle aspiration cytology (FNAC) is the method of choice in the diagnosis of PTC.¹⁰

Preoperative diagnosis by FNAC is mainly based on recognition of papillary structures and typical nuclear characteristics, such as Orphan Annie nuclei, intranuclear pseudoinclusions (due to cytoplasmic invaginations) and nuclear grooves (folds in the nuclear membrane) in the aspiration smear.⁷ The accuracy of diagnosis with FNAC is about 90% when correlated with the postoperative diagnosis of surgical specimens.¹¹ Ultrasonography is usually carried out to improve the diagnostic yield of FNAC. The confirmatory diagnosis is made by histopathology and/or immunohistochemistry. Definitive treatment includes surgical intervention with total thyroidectomy or lobectomy followed by radiation therapy.⁴

This case report describes a 25 year-old male patient with two anterolateral neck swellings for two years who was diagnosed by FNAC with metastatic papillary carcinoma of right cervical lymph nodes with occult papillary carcinoma of thyroid in the Department of Histopathology, Diabetic Association Medical College (DAMC), Faridpur.

Case Presentation

A male student of 25 years, normotensive, non-diabetic, non-smoker, hailing from Madaripur, Faridpur, came as an outpatient in the department of Histopathology, Diabetic Association Medical College Hospital on 18 June 2022 for FNAC of two swellings on his neck. He presented with two lymph node swellings on right antero-lateral side of neck for two years. Clinically he was diagnosed as cervical lymphadenopathy and was advised for ultrasonogram (USG) and FNAC. USG report revealed a small solid nodule with calcifications, measuring about 2×1cm in thyroid gland with enlarged two lymph nodes in right side of neck at the level of C3 and C6. FNAC was done twice from the thyroid gland and both the swellings on the neck with proper aseptic measures. On aspiration blood mixed material was collected each time. Twelve slides were prepared, stained properly with Pap stain and observed

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dunder light microscope. Smears from the thyroid showed few clusters of atypical thyroid follicular cells with papillary fragments and smears from the lymph nodes displayed papillary clusters of malignant cells with nuclear and cellular pleomorphism with increased nuclear cytoplasmic ratio, hyperchromatism, inconspicuous nucleoli and moderate cytoplasm. Nuclear changes were evident which included presence of nuclear grooving and intranuclear pseudoinclusions. Diagnosis was given as PTC with metastatic papillary carcinoma of the right cervical lymph nodes. The patient was asymptomatic and did not bother to take treatment options earlier. The swellings did not increase in size much during this period. He had no history of fever, weight loss, dyspnea, dysphagia or hoarseness of voice, hypothyroid or hyperthyroid symptoms or significant radiation exposure to the neck. The family had no history of thyroidal illness.

After the initial diagnosis, patient went back to Madaripur and was admitted to City hospital for removal of thyroid gland and the lymph nodes. The preoperative laboratory investigations were done which revealed Hb% 15.4g/dl, ESR 10 mm/1st hour, total WBC count 7,830/cmm, platelet count 285,000/cmm, blood group O⁺, RBS 5.55 mmol/L, S. Creatinine 1.04 mg/dl, HbsAg- negative, chest X-rays and echocardiography yielded normal findings. His TSH, T₃ and T₄ levels were within normal limits. His weight was 52 kg. Total thyroidectomy with bilateral neck dissection was done six days after the initial diagnosis and the patient was discharged on day five without any complications. The resected specimens consisted of both lobes of thyroid gland and 11 cervical lymph nodes and were sent to Department of Pathology, BSMMU for histopathology. There was a single solid mass in the right lobe of thyroid measuring about 2.3 × 2 cm with calcification. Histopathology report came back as PTC with lymph node metastasis and the pTNM staging was T2N3Mx. After final diagnosis, the patient was referred to the Institute of Nuclear Medicine and Allied Sciences, Dhaka, to receive radioiodine therapy. His 50th POD investigations included S. TSH >60mIU/L, S. thyroglobulin 56.64 ng/ml, Anti TG ab 1.2 IU/ml, S. parathormone 17.1 pg/ml, S. calcium 6.9 mg/dl, S. albumin 5 gm/dl, vitamin D3 24.48 ng/ml and thyroid scan: small area of focal radiotracer uptake in the upper midneck. He was advised to follow up after four weeks of his 1st dose of radioiodine therapy. The patient claims to be healthy and is back to his normal active life.

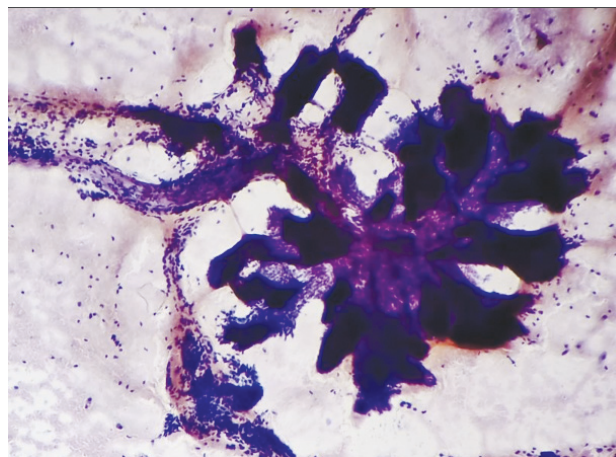


Fig. 1: Photomicrograph of Papillary carcinoma thyroid showing papillary fragments; pap stain, ×100

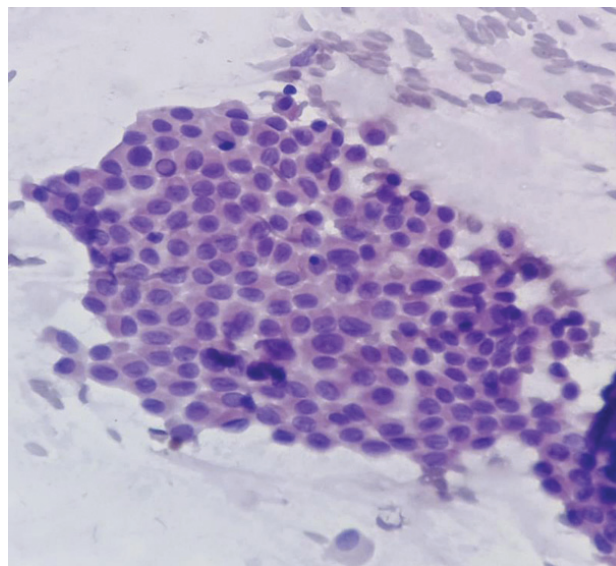


Fig. 2: Photomicrograph of Metastatic Papillary carcinoma showing nuclear changes; pap stain, ×100

Discussion

PTC is the one of the commonest endocrine malignancies, most of which is well differentiated with excellent prognosis.¹² Radiation exposure increases risk of thyroid malignancy, particularly papillary carcinoma.¹³ Pre-existing multinodular goitre may turn into follicular thyroid cancer.¹⁴ A family history of thyroid cancer is a risk factor for both papillary and non-papillary thyroid cancers. Cowden syndrome, familial adenomatous polyposis, Werner's syndrome, Carney complex type 1 and McCune Albright syndrome all are associated with non-medullary thyroid cancers. This case had no such history and showed no symptoms regarding the thyroid lesion. PTC is much more common in women (between 2:1 and 4:1) and has a median age at presentation of 50 years.^{15,16} The present case report describes a unique presentation of PTC due to the

less than ordinary demographics of the patient. The patient described was an otherwise healthy male who presented with antero lateral neck swellings at the age of 25 years. A case report of a patient showed a cervical swelling of 5 cm for 15 months and who suffered from dysphagia and dysphonia.¹⁷ It appears therefore that size and duration of the mass alone do not essentially correspond to its debilitating potential.

In a series of seven cases of solitary lateral neck mass due to occult underlying thyroid carcinoma, the mean time of mass presence was 5.1 months with a maximum of 12 months¹⁸, which is far less than the two years of slow growth this patient had experienced.

Grossly the lesions are often 2-3 cm in size although they may be varying in size. They are solid, white, show calcification and may even be cystic and thereby confound the diagnosis.¹⁹ Microscopically, the neoplastic papillae have a central core of fibrovascular tissues. Psammoma bodies are seen in 50% cases, Orphan Annie eye nuclei and intracytoplasmic inclusions and nuclear pseudoinclusions are also seen. About 50% cases may have regional lymph node metastases at the time of presentation. It may also present as a cervical lymph node without any obvious thyroid swelling. Distant metastases are uncommon.²⁰ Clinically the lesion may be a firm or hard, thyroid swelling, without any signs of compression usually. Lymph node metastasis first involves pre and paratracheal lymph nodes, followed by paraglandular, deep upper cervical, deep lower and lateral cervical and submandibular nodes.²¹ Diagnosis is made on FNAC, cold nodule on radioisotope scan, high TSH level in blood, USG neck for both thyroid and lymph node status. CT scan of neck is indicated only in specific circumstances and not routinely. Features of greatest prognostic value include patient's age at presentation, small tumour size, total encapsulation, extra thyroid extension, multicentricity and presence of distant metastases.²² Treatment is near total or total thyroidectomy with central node compartment dissection. Depending on involvement of cervical lymph nodes, lateral cervical or modified radical neck dissection is done.²³ Total thyroidectomy has the advantage that it allows monitoring of post-operative thyroglobulin levels, post-operative radioiodine can be used to detect residual disease, residual normal tissue and local or distant metastases.²⁴

Conclusion

Among most common thyroid malignancies, PTC may present as cervical lymphadenopathy without significant thyroid enlargement. Benign conditions, such as branchial cysts, non-specific lymphadenitis, and tuberculosis constitute the underlying causes in the majority of patients with cervical masses. Nonetheless, malignant conditions such as occult papillary thyroid carcinoma must be taken into consideration. This case report emphasizes that a strong clinical suspicion is essential in the work-up of neck masses despite an apparently benign course even with no

apparent history or risk factors of malignant disease. Also, both FNAC and imaging should be performed in all patients with cervical masses and allow for adequate surgical planning.

Conflict of interest: No

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Information for Authors

General Information

Aims & Scope:

The Diabetic Association Medical College journal is a scientific journal dealing with clinical medicine, basic sciences, epidemiology, public health and various health care specialities. It is an official organ of Diabetic Association Medical College and going to be published bi-annually (January and July).

The journal publishes articles of authors from any part of the globe/country. It intends to publish the highest quality material on all aspects of medical science. It accepts original research articles, review articles, short communications, case reports and letters to editor. In addition, it provides readers with opinion regarding the articles published in the journal. Complimentary print copies of the journal are sent to libraries of all medical colleges and other relevant academic institutions in the country.

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Manuscript written in English on bio-medical topics will be considered for publication provided these have not been published previously and are not under consideration for publication elsewhere.

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Acknowledgement:

1. Contributions that need acknowledgement but do not justify authorship, such as general support by a dept. or dept. chairman.
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As an option, if a journal carries continuous pagination throughout a volume (as many medical journals do) the month and issue number may be omitted:

Halpern SD, Ubel PA, Caplan AL. Solid-organ transplantation in HIV-infected patients. *N Engl J Med*. 2002;347:284-7

More than six authors:

Rose ME, Huerbin MB, Melick J, Marion DW, Palmer AM, Schiding JK, et al. Regulation of interstitial excitatory amino acid concentrations after cortical contusion injury. *Brain Res*. 2002; 935(1-2):40-6

Optional addition of a database's unique identifier for the citation:

Halpern SD, Ubel PA, Caplan AL. Solid-organ transplantation in HIV-infected patients. *N Engl J Med*. 2002 Jul 25;347(4):284-7. PubMed PMID:12140307

Organization as author:

Diabetes Prevention Program Research Group. Hypertension, insulin's and proinsulin In participants with impaired glucose tolerance Hypertension. 2002;40(5):679-86

No author given:

21st century heart solution may have a sting in the tail *BMJ*. 2002;325(7357):184

Volume with supplement:

Geraud- G, Spierings EL, Keywood C. Tolerability and safety of frovatriptan with short- and long-term use for treatment -of migraine and in comparison with sumatriptan. *Headache*. 2002;42 Suppl 2:S93-9.

Issue with supplement:

Glauser TA. Integrating clinical trial data into clinical practice. *Neurology*. 2002;58(12 Suppl 7):S6-12.

Article published electronically ahead of the print version:

Yu WM, Hawley TS, Hawley RG, Qu CK. Immortalization of yolk sac-derived precursor cells. *Blood*. 2002 Nov 15; 100(10):3828-31. Epub 2002 Jul 5.

2. Books and Other Monographs

Personal author(s):

Murray PR, Rosenthal KS, Kobayashi GS, Pfaller MA. Medical microbiology. 4th ed. St. Louis: Mosby, 2002.

3. Other Published Material

Newspaper article:

Tynan T. Medical improvements lower homicide rate: study sees drop in assault rate. The Washington Post. 2002 Aug 12; Sect. A: 2 (col.4). Dictionary and similar references:

Dorland's illustrated medical dictionary. 29th ed. Philadelphia: W.B. Saunders; 2000. Filamin; p. 675.

4. Unpublished Material

In press or Forthcoming:

Tian D, Araki H, Stahl E, Bergelson J, Kreitman M. Signature-of balancing selection in Arabidopsis. Proc Natl Acad Sci U S A. Forthcoming 2002.

5. Journal Article on the Internet

Abood S. Quality improvement initiative in nursing homes: the ANA acts in an advisory role. Am J Nurs [Internet]. 2002 Jun [Cited 2002 Aug 12] 102(6): [about 1, p.]. Available from: <http://www.annals.org/cgi/reprint/145/1/62.pdf>

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