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ENDOCRINE REFERRAL PATTERN: EXPERIENCE FROM A MEDICAL COLLEGE HOSPITAL

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ABSTRACT

Background: Referral is an integral part of comprehensive disease management, particularly when it involves multiple complications and comorbidities. Data regarding the referral pattern of endocrine diseases are scarce in the literature, especially from Bangladesh. **Aim:** To find out the referral patterns and spectrum of endocrine diseases among the referred patients. **Materials and Method:** This retrospective observational study included all consecutive patients who were referred to the endocrinologist from March 2022 to October 2024. Relevant clinical information of the referred patients was extracted from the referral registrar book. **Results:** A Total of 759 patients (Male 185, 24.4%; Female 574, 75.6%; median age 45 years were included in the study. The majority of the patients were referred from the inpatient department (IPD) (428, 56.4%). Medicine and allied departments were the main source (303, 39.9%) of referrals, followed by Surgery (240, 31.6%), Gynecology (204, 26.9%), and others (12, 1.6%).The majority of the patients suffered from multiple active non-endocrine diseases (≥two diseases, 651, 85.7%); however, most of the patients were referred for a single endocrine disease (640, 84.3%). Among the endocrine causes of referral, diabetes mellitus (DM)(612,80.6%) was the most common cause of referral, followed by thyroid disorder(TDs) (152,20%). Among referred patients with DM, multiple endocrine diseases were present in 97(15.8%) cases, and TDs were present in 60(9.8%). Among other endocrine referrals, reproductive endocrine disease, adrenal disease, and electrolyte imbalance accounted for 32 (4.2%), 23 (3.0%), and 35 (4.6%), respectively. **Conclusion:** DM and TDs are the two most common forms of referral, followed by reproductive endocrine disease and adrenal disease, with more than half of the referred patients from IPD.

Keywords: Referral patterns, Endocrinology, Diabetes, Thyroid, Adrenals

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INTRODUCTION

Endocrinology and metabolic medicine involve the diagnosis and treatment of disorders of the endocrine glands and hormones, their target organs, and metabolism. Endocrine disorders are common in our general practice; DM and TDs are the most common endocrine disorders among them[1].Worldwide, 588.7 million people (aged 20-79 years) have been suffering from DM, and almost twice as many have prediabetes[2]. The overall prevalence of DM in Bangladesh is 7.8%, and prediabetes is 10.1%[3]. Approximately 200 million people have been suffering from different types of TDs[4]. A recent study from Bangladesh among three occupational groups (housewives, college students, rickshaw-pullers) reported that the overall thyroid dysfunction among the study population was 7%, and it was 12.9% among those having preexisting DM[5].

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Patients with type 2 DM and TDs, especially hypothyroidism, have a heightened risk of living with multiple comorbidities, particularly with obesity, metabolic syndrome, cardiovascular, renal, and cerebrovascular diseases[6,7]. Due to the complex nature of the disease and the presence of multiple complications and co-morbidities, these patients are often referred to the endocrinologist for comprehensive management.Approximately 171.5 million people are living in Bangladesh with diverse endocrine and metabolic disorders[8], however, the number of endocrinologists is not sufficient to deal with this huge disease burden. The knowledge of the pattern of endocrine referrals is crucial for optimizing resources and guiding public health interventions. With this knowledge, public health experts and government policymakers can optimize care and allocate resources to achieve a sustainable healthcare system for our increasing population with an endocrine disease burden. However, there is a dearth of information about the endocrine referral pattern in Bangladesh. The study aims to find out the reasons behind referral, the sources of referral, common disease patterns, overall comorbidities, and the number of active diseases among the referred patients to create baseline data for further research and planning to create a referral guideline in the near future.

MATERIALS AND METHOD

Study design and study population

This retrospective observational study was done in the department of Medicine (Endocrinolony wing) by the endocrinologist at the Medical College for Women & Hospital, Uttara, Dhaka. All consecutive patients who were referred to the endocrinologist from March 2022 to October 2024 were included in the study. Relevant clinical information of the referred patients was extracted from the referral registrar book.The personal identity of the study subjects was kept confidential. Ethical approval was taken from the ethical committee of the same institution, memo number: MCWH/Ethical Committee/2025/15(3).

Patients were referred for different types of endocrine problems, including some non-endocrine problems at different time points. If one patient was referred for multiple times for the same disease, it was counted as a single consultation or single referral. However, if the same patient was admitted in the hospital at different times and referred for completely different reasons, then it was counted as two different consultations or referrals. All consultations were recorded in a registrar book with some basic information, e.g., age, sex, sources of referral, primary diagnosis, and reasons for referral. Data were entered intoan Excel document and copied to SPSS version 25.0 for final analysis. Patients who were referred to endocrinologist and found to have non-endocrine causes were excluded from this study.Initially, 761 patients were included in the study, who fulfilled the inclusion criteria; two patients were excluded during analysis due to incomplete data. Finally, we analysed data from 759 patients.

Statistical analysis

Quantitative data were expressed as the mean ± standard deviation (SD), and median with interquartile range (IQR) as applicable. Qualitative data were presented as frequency (number) and percentage (%). Referral patterns were analyzed by Fisher's exact test and chi-square test as applicable. A *p*-value of <0.05 was consideredstatistically significant at a 95% confidence interval (CI).

RESULTS

In this retrospective study, we observed majority of referred patients were female (75.6%), median age of referred patients were 45 years (IQR 34-58). Hypertension was the most common comorbid condition among the referred patients (33.6%) followed by renal dysfunction (10.9%) and ischemic heart disease (4.7%). Approximately half (49.5%) of the referred patients had three or more active non-endocrine diseases. The majority of the patients had one endocrine disease during referral (84.3%); however, multiple endocrine disorders were observed in a significant number of patients (two diseases, 13.8%, three or more diseases, 1.8%) (Table 1).

Most of the patients were referred from the medicine and allied departments (39.9%), followed by the surgery and allied departments (31.6%), and the majority of them were referred from IPD (428 out of 759, 56.4%) (Table 2).

Diabetes and thyroid disorders were the most common causes of referral among the study subjects. Considering the reasons of referral, 80.7% were referred for disorders of the endocrine pancreas. All were suffering from different types of DM [T2DM 73.9%, gestational diabetes mellitus (GDM) 5.4%, Secondary and other types of DM 1.3%] except one case, which was referred for spontaneous hypoglycemia. Among the referred patients with DM, multiple endocrine diseases were present in 97(15.8%) cases, and TDs were present in 60 (9.8%) of cases. Overall, TDs causing referral constituted 20% of the referred patients. Hypothyroidism contributed half of the referrals (10.8%) in this group, and nearly half of this group were referred for thyrotoxicosis (9.4%). Graves' disease was the most common among the patients with thyrotoxicosis (44 out of 65). Adrenal disorders were present in 3% of referred patients, and the most common adrenal cause of referral was Iatrogenic Cushing with Secondary adrenal insufficiency (20 out of 23). Reproductive problems were observed in 4.2% of referred patients. Polycystic ovarian syndrome (PCOS) was the most common cause of referral in females (8 of 21) and hypogonadism (4 of 11) in the male group, (Table 3).

Among the referred patients, males were relatively older than female group {55 (40-65) years vs. 45 (33-55) years, median with IQR, $p<0.0001$). Female were presented with multiple endocrine disease (Female vs. Male: 18.1% vs. 8.1%; $p<0.0001$), thyroid disorders were observed to be very high in female group compared to male (23.5% vs. 9.2%; $p<0.0001$), however, frequency of DM were observed to be the same between the female and male (80.8% vs. 80.5%, $p=0.915$).Lower total disease burden was found among patients younger than 40 years and rise in this burden was significantly associated with increasing age ($p<0.0001$). Diabetes was observed more commonly above 40 years of age group (<40years vs. ≥40years: 64.6% vs 89.2%, $p<0.0001$), however, thyroid disorders was observed more commonly in under 40 years age group (<40years vs. ≥40years: 28.4% vs. 15.7%, $p<0.0001$) among the referred patients. Total disease burden was very high among the diabetes patients compared to non-diabetes referred patients (>Two diseases in DM group vs. non-DM group: 54.8% vs. 27.4%; $p<0.0001$) (Table 4).

Table 1: Clinical characteristics of the referred patient to the endocrinology wing (n=759)

Variables	Frequency (%)
Age (year), median with IQR	45 (34-58)
Sex	
Male	185(24.4)
Female	574(75.6%)
Co-morbidities	
Any comorbidity	286(37.7)
Hypertension	255(33.6)
Renal Dysfunction (CKD or AKI)	83(10.9)
Ischemic Heart Disease	36(4.7%)
Asthma/COPD	23(3.0)
Cerebrovascular Disease	24(3.2)
Number of active diseases among referred patients	
1	108(14.2)
2	275(36.3)
≥3	376(49.5)
Number of endocrine diseases diagnosed during referral	
1	640(84.3)
2	105(13.8)
≥3	14(1.8)

CKD: chronic kidney disease; AKI: Acute kidney injury; COPD: Chronic obstructive pulmonary diseases; Percentages within parentheses are expressed over the column total ;n:Total number of referred patients

Table 2: Sources of referral (n=759)

Subspecialty	IPD	OPD	*n(%)	†Percent over total
Medicine and Allied			**303**	**39.9**
Internal Medicine	156(36.4)	59(17.8)	215(71.0)	28.3
Cardiology	6(1.4)	14(4.2)	20(6.6)	2.6
Nephrology	2(0.5)	2(0.6)	4(1.3)	0.5
Dermatology	0	21(6.3)	21(6.9)	2.8
Physical Medicine	0	5(1.5)	5(1.7)	0.7
Psychiatry	0	10(3.0)	10(3.3)	1.3
ICU & HDU	28(6.5)	0	28(9.2)	3.7
Surgery and Allied			**240**	**31.6**
General Surgery	107(25.0)	33(10.0)	140(58.3)	18.4
Ophthalmology	1(0.2)	13(3.9)	14(5.8)	1.8
ENT	9(2.1)	18(5.4)	27(11.3)	3.6
Orthopedics	33(7.7)	22(6.6)	55(22.9)	7.2
Urology	0	4(1.2)	4(1.7)	0.5
Gynecology & obstetrics			**204**	**26.9**
Gynecology & obstetrics	81(18.9)	123(37.2)	204(100)	26.9
Others			**12**	**1.6**
Dental unit	0	2(0.6)	2(16.7)	0.3
Pediatrics	5)1.2)	1(0.3)	6(50.0)	0.8
E&C	0	4(1.2)	4(33.3))	0.5
Total	**428**	**331**	**759**	**100**

Percentages within parentheses are expressed within the group* and over the column total†; ICU & HDU: Intensive care unit and High dependency unit; ENT: Ear, nose, and Throat department ;E&C: Emergency and Casualty department;IPD: Inpatient department, OPD: Outpatient department; n: Total number of referred patients.

Table 3: Spectrum of endocrine disorders already diagnosed or diagnosed after endocrine consultation (n=759)

Spectrum of Endocrine Diseases	Frequency (%)
Endocrine Pancreas	**613(80.7)**
Type 2 DM	561(73.9)
GDM	41(5.4)
Secondary DM due to pancreatitis	10(1.3)
Spontaneous Hypoglycemia	1(0.1)
Thyroid disorders	**152(20.0)**
a. Hypothyroidism	80 (10.8)
Overt Hypothyroidism	55(7.2)
Subclinical Hypothyroidism	25(3.6)
b. Hyperthyroidism	65(9.4)
Graves' Disease	44(5.8)
Toxic Multinodular Goiter	12(1.6)
Subacute thyroiditis (SAT)	4(0.5)
Gestational Transient Thyrotoxicosis (GTT)	3(0.4)
Solitary Toxic Nodule (STN)	2(0.3)
c. Sick Euthyroid Syndrome	2(0.3)
d. Thyroid Malignancy	3(0.4)
Calcium & Parathyroid Disorders	**6(0.8)**
Primary Hypoparathyroidism	3(0.4)
Primary hyperparathyroidism	2(0.3)
Secondary hyperparathyroidism	1(0.1)
Obesity & Metabolic Syndrome	**11(1.4)**
Adrenal disorders	**23(3.0)**
Endogenous Cushing syndrome	1(0.1)
Iatrogenic Cushing with Secondary adrenal insufficiency	20 (2.6)
Primary adrenal insufficiency	1(0.1)
Adrenal Myolipoma	1(0.1)
Reproductive	**32 (4.2)**
Female Reproductive	
PCOS	8(1.1)
Menstrual disorders	4(0.5)
PMS	3(0.4)
POF	1(0.1)
Female Infertility	5(0.7)
Male Reproductive Disease	
Hypogonadism	4(0.5)
Male Infertility	3(0.4)
Micropenis	2(0.3)
Others	2(0.2)
Pituitary & Hypothalamic Disease	**5(0.7)**
Hyperprolactinemia	2(0.3)
Sheehan Syndrome	2(0.3)
Short Stature due to GH deficiency	1(0.1)
Electrolytes Imbalance	**35 (4.6%)**

Percentages within the parenthesis are expressed over the total number of patients referred and which is not mutually exclusive; PCOS: Polycystic Ovarian Syndrome; PMS: Post-menopausal Syndrome; POF: Premature Ovarian Failure; n: Total number of referred patients

Table 4: Clinical profile of referral patients based on gender, age, and status of diabetes (n=759)

Referral pattern based on gender			
Gender Category	**Female(n=574)**	**Male(n=185)**	**P value**
Age, Median (IQR)	45(33-55)	55(40-65)	**<0.0001**
Number of total active diseases			
≤2	287(50.0)	96(51.9)	0.358
>2	287(50.0)	89(49.5)	
Number of total endocrine diseases			
1	470(81.9)	170(91.9)	**<0.0001**
≥2	104(18.1)	15(8.1)	
Diabetes: Present	464(80.8)	149(80.5)	0.915
Thyroid Disorders: Present	135(23.5)	17(9.2)	<0.0001
Referral pattern based on age category			
Age category	**Age <40 (n=257)**	**Age ≥40 (n=498)**	
Sex: Female	213(82.9)	358(71.9)	**<0.0001**
Number of total active diseases			
≤2	166(64.6)	213(42.8)	**<0.0001**
>2	91(35.4)	285(57.2)	
Number of total endocrine diseases			
1	211(82.1)	425(85.3)	0.146
≥2	46(17.9)	73(14.7)	
Diabetes: Present	166(64.6)	444(89.2)	**<0.0001**
Thyroid Disorders: Present	73(28.4)	78(15.7)	**<0.0001**
Referral pattern based on the status of DM			
Status of DM	**Non-DM (n=146)**	**DM (n=613)**	
Age	34(25-47)	47(38-60)	**<0.001**
Sex: Female	110(75.3)	464(75.7)	0.503
Number of total active diseases			
≤2	106(72.6)	277(45.2)	**<0.0001**
>2	40(27.4)	336(54.8)	
Number of total endocrine diseases			
1	124(84.9)	516(84.2)	**0.468**
≥2	22(15.1)	97(15.8)	
Thyroid Disorders: Present	**92(?63.0)**	**60(9.8)**	**<0.0001**

Age was not normally distributed, compared between groups by the Mann-Whitney U test, and Categorical variables were analysed by the Fisher Exact test; n: Total number of referred patients

DISCUSSION

Our study mainly focused on patterns of referral to the endocrinologist in a private medical college hospital of Dhaka city. Endocrine referral patterns were studied in both adult and pediatric populations,and also endocrine surgical unit in different countries[9-12]. To the best of our knowledge, this is the first study reporting referral patterns of such type of disease in Bangladeshi populations. Like Idowu et al. and Adegoke et al.[9,10], we observed, uncontrolled DM was the most common cause of referral in our study population. We observed about 80% of referred patient had uncontrolled DM, which is relatively higher compared to Idowu et al.[9](68.7%) and Adegoke et al.[10] (55.7%). Bangladesh ranked 7th in global burden of

DM according to International Diabetes Federation Atlas 2025 with currently 14 million subjects suffering from diabetes[2]. The higher DM burden in the general population may be due to uncontrolled DM, as the leading cause of referral to the endocrinologist. Another important issue in our DM population is the coexistence of multiple active non-endocrine diseases (more than two active non-endocrine diseases present in 54.8%) and of multiple other endocrine diseases (two or more endocrine diseases were present in 15.8%) in DM patients.

We also observed TDs was the second most common cause of endocrine referral, similar to Idowu et al.[9] and Adegoke et al.[10] Among all the referred patients, TDs were present in 20% of the patients, which is very close to study findings done by Adegoke et al. (24.6%) but relatively higher to Idowu et al. (11.1%). Our study population were mostly female (75.6%)[10], and we observed female has relatively higher prevalence of thyroid disorder (female vs. male 23.5% vs. 9.2%; $p<0.0001$) in our study population. Idowu et al. and Adegoke et al.[9,10] has study population with male predominance (50.9% and 51.6%) and main sources of referral were from OPD of general practitioners, whereas, our main source of referral was from IPD (56.4%), mainly from medicine and allied departments (31.6%) which could make the difference in overall number of thyroid disorders among the referred patients. Patients, who were referred for TDs, had very diverse presentations ranging from sub-clinical to overt hypothyroidism and hyperthyroidism to sick euthyroid syndrome, thyroid malignancy, thyroid nodule, and gestational transient thyrotoxicosis compared to Adegoke et al[10].

Adrenal disorders contributed a significant number of referrals in our study. Majority of them were referred for tapering of steroid for patients with chronic steroid use causing them iatrogenic Cushing syndrome with secondary adrenal insufficiency, however one patient with adrenal incidentaloma were referred and after adrenal imaging, we diagnosed it as a case of Adrenal Myolipoma. Adrenal Myolipoma is a benign tumor of adrenal gland frequently found as incidentaloma, contribute around 3.3-6.5% of all adrenal mass[13].

One study from Bangladesh on the spectrum of adrenal disorder from a referral hospital reported, most common adrenal disease is adrenal insufficiency (75.8%). Endogenous Cushing syndrome contributes only 8.8% of total adrenal diseases. Among adrenal insufficiency majority of them (78.3%) are secondary adrenal insufficiency and 75.9% are iatrogenic Cushing syndrome with secondary adrenal insufficiency[14]. We observed the similar patterns of adrenal referral among our referred patients. We noted only one case of endogenous Cushing syndrome during referral which was very low in frequency. Overall, the endogenous Cushing's syndrome is very uncommon in our daily practice, and its incidence is 0.7–2.4 per million population per year which were reported in various studies[15,16].

Reproductive problems among females are more commonly seen in our referral cases. PCOS is the most common cause of referral among female reproductive problems, which corresponds to the study finding in the female category[17]. Menstrual disorders like post-menopausal syndrome, and premature ovarian failure were also seen in a significant number of patients. Referral is an integral part of comprehensive disease management.

Study reported, many important data of the referred patients, including demographics, diagnoses, history, and examination findings, which are commonly seen incomplete or inadequate during referral [18]. We also observed similar issues during the management of referred

patients. Using a structured template during referral improves the completeness of the patient data and improves the overall quality of services [19]. In Bangladesh, there is no structured referral system. A significant number of patients are self-referred, and many of them are not aware of the referral system. The findings of our study would help us to know the referral patterns and may work as a foundation for future research.

LIMITATIONS

First of all, our study was done in a single private medical college hospital; patients from multiple hospitals would make the data more diverse. Additionally, our study mainly focused on referral patterns and the disease profile of referred patients. The outcome of the referral was not evaluated. If we could include the outcomes of referral (e.g., appropriateness of diagnosis, hospital stay, time to control disease, economic benefit, overall prognosis), it would be more beneficial. As the data regarding referral patterns is lacking in our setting, the study findings would lay the foundation for further research on the aforementioned knowledge gap.

CONCLUSION

Uncontrolled DM with multiple active non-endocrine diseases was the common disease profile among the referred patients. An inpatient specialist diabetes care team with expertise in DM management in a hospital setting could reduce the overall referral rate in the majority of patients and ensure the quality of services. Our national policymakers can emphasize this issue to improve treatment outcomes.

CONFLICT OF INTEREST

There is no conflict of interest.

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