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Audit For Endocrine Assay in a Rural Tertiary Care Centre: Clinical Chemistry Lab Perspective.

Shreya Namjoshi[1], Mimansa Dixit[1], Ajay Kedar[1], Kanchan Mohod[2], Abhijit Ninghot[3], Kalyan Goswami[4], Satish Kumar[5]

[1]MBBS Third Year Student, Mahatma Gandhi Institute of Medical Sciences, Sevagram.
[2]Associate Professor, Department of Biochemistry, Mahatma Gandhi Institute of Medical Sciences, Sevagram.
[3]Assistant Professor, Department of Biochemistry, Government Medical College, Nagpur.
[4]Additional Professor, Department of Biochemistry, All India Institute of Medical Sciences, Raipur.
[5]Professor & Head, Department of Biochemistry, Mahatma Gandhi Institute of Medical Sciences, Sevagram.

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ABSTRACT

Background: Endocrine disorders account for a significant amount of the global burden of disease. Hospital-based data provide substantial insight into the patterns of disease at community level to bridge the gaps in literature about the epidemiology of specific endocrine disorders, to aid in early diagnosis and identify priority areas for resource allocation. **Methods:** It was a cross sectional study conducted in the Department of Biochemistry, MGIMS, Sevagram. Secondary data analysis of Electronic Medical Records spanning over the years 2016 and 2017 was done. **Results:** A total of 1739 patients, 702 in 2016 and 1037 in 2017 were included in which substantially more investigations were ordered for females in OPD whereas in IPD, more tests were ordered for male patients. **Conclusion:** This study helps us gain an insight into the trends followed by some endocrine abnormalities in patients of a tertiary care centre in Central India. They throw light upon the burden of disease on the community that our focus during screening for early diagnosis as well as while formulating policies should be these hormones.

Keywords: Audit Report, Endocrine assay, Clinical lab perspective.

INTRODUCTION

Endocrine disorders are a varied group of conditions that affect growth, development and reproduction.[1] Thyroid disorders are among the commonest endocrine disorders worldwide. Early diagnosis and treatment remain the cornerstone of management.[2] Furthermore, Indians have a high prevalence of insulin resistance syndrome that may underlie their greater than normal tendency to develop diabetes mellitus and early atherosclerosis.[3]

Differences in the incidence, prevalence, mortality, and burden of diseases and other adverse health conditions among specific population groups exist throughout the world, in developed and developing nations alike.[4] Although, endocrine disorders account for a significant amount of the global disease burden, in developing countries, little attention is paid to these disorders, often resulting in an increased rate of mortality and morbidity.[5,6] Thus, the spectrum of these disorders is not well described in most developing countries.[7]

Name & Address of Corresponding Author
Dr. Kanchan Mohod,
Associate Professor,
Department of Biochemistry,
Mahatma Gandhi Institute of Medical Sciences, Sevagram,
District Wardha, Maharashtra – 442 102.

The primary sources of data on global disease prevalence are from the World Health Organization, used to explore underlying mechanisms contributing to endocrine health disparities. A comprehensive epidemiology is essential to identify the priority areas for resource allocation in tackling the menace of the noncommunicable diseases.[8]

There has, however, been no comprehensive survey and compilation of data regarding the epidemiology of endocrine and metabolic disorders to serve as a unified source of information about these conditions. Although hospital-based data are inevitably referral- and access-biased, they provide substantial insight into the types of diseases, the usual age of presentation, and their burden on inpatient service.[9] All this information and statistics would be invaluable in the rational setting of priorities in view of the limited resources allocated for management of these disorders, if analysed retrospectively. Our study aims at bridging the gaps in literature, and compensating for the dearth of data regarding the same.

MATERIALS AND METHODS

Study Design:

A retrospective study analysing the Electronic Medical Records (EMR) will be carried out in the

Department of Biochemistry, MGIMS, Sevagram. Biochemical assays performed for the following hormones - Thyroid (TSH, T3, T4, FT3, FT4), Insulin, Sex steroids (Testosterone, Progesterone, Oestrogen, FSH, LH), Prolactin, Adrenal Hormones, Growth Hormone, ACTH, PTH, Vitamin D assay

Sample Size:

All the patient records spanning over the last two years (Jan 2016- Dec 2017) having the above-mentioned hormone assays performed were included in the study.

Method:

The data for endocrine assays done in the years 2016 and 2017 was retrieved from the Hospital Information System (HIS). The patients were categorised according to year wise distribution, male/female sex, age groups, the wards from which the specific test was raised, and the hormone for which the endocrine assay was done. All this data was entered in an excel sheet methodically to aid in statistical analysis.

Ethical Considerations:

Our study was started after gaining approval from the MGIMS Institutional Ethics Committee. The study did not involve patient interaction, but only analysis of previously collected data, during which anonymity and confidentiality of the patients was maintained.

RESULTS

This study included the endocrine hormone assays done for specific hormones for all patients during a period of 2 years (Jan 2016 – Dec 2017) from both OPD and IPD. There were a total of 1739 patients, 702 in 2016 and 1037 in 2017. Out of these, there were a total of 194 male patients in 2016, and 270 male patients in 2017 whereas the number of female patients was significantly higher with 508 female patients in 2016 and 767 female patients in 2017. [Figure 1]

The patients were categorised according to Male/Female and OPD/IPD which showed that substantially more investigations were ordered for females in OPD whereas in IPD, more tests were ordered for male patients as compared to females. [Figure 2&3]

The distribution of thyroid related investigations in males and females also showed a similar trend. Total males for whom thyroid hormone investigation was done were 440 as opposed to 1253 females. In OPD, 364 males and 1219 females had thyroid hormone investigation done whereas in IPD, 126 males but only 34 females had thyroid hormone investigation done. [Figure 4]

Other than thyroid hormones, Vitamin D assay was the investigation ordered most across both Departments and both years. Looking at the results of only OPD in both years, Vitamin D assay was ordered maximum number of times. In IPD also, in 2016, Vitamin D assay was ordered the most, but in 2017, Cortisol followed by Parathormone was the hormone investigated most.

The number of insured patients among males and females is more than the number of patients who did not avail any health insurance benefit.

The highest number of thyroid hormone investigations in the surgical wards for males were found to be ordered from Surgery Ward including Private Wards. This was followed by Orthopaedics, Ophthalmology and Radiotherapy. In medical wards, maximum investigations were ordered from Medicine Ward followed by Medicine ICU and CathLab. Amongst other hormones, most number of investigations were ordered for Cortisol assay from Medicine ICU followed by Vitamin D assay.

Among female IPD patients, maximum investigations were ordered for thyroid hormone assays in both years from Private Ward and Medicine Ward. This was followed by Vitamin D assay in Private Ward and ENT.

In the various age groups among males, we found thyroid hormone assays to have been done the most in middle age groups, i.e. 31 to 70 years of age. Vitamin D assays were ordered more for older ages, i.e. 51 to 80 years of age. Cortisol was assayed most in the age group of 41 to 70 whereas assays for Insulin, FSH, Testosterone, PTH had a scattered distribution and no specific range was noted. [Figure 17]

Among females, maximum assays for thyroid hormones were done in the age group of 21 to 60, while for Vitamin D, most assays were done for women in the age group of 31 to 70. FSH and Cortisol assays had a scattered age distribution while Prolactin was assayed most in women of reproductive age group i.e 21 to 40. [Table 1]

Table 1: Odds Ratio for Thyroid hormones, Vitamin D assays, Parathormone, Cortisol, Insulin, FSH, Testosterone, Prolactin.

Category	Abnormal	Normal	Odds Ratio	Lower Limit	Upper Limit
Male OPD 2016	34	104	0.9097	0.5445	1.52
Male OPD 2017	46	128			
Female OPD 2016	193	379	1.236	0.9758	1.565
Female OPD 2017	211	512			
Male OPD 2016	34	104	0.642	0.4201	0.9812

Female OPD 2016	193	379			
Male OPD 2017	46	128	0.872	0.6005	1.266
Female OPD 2017	211	512			
Male IPD 2016	13	30	1.396	0.6037	3.23
Female IPD 2016	6	11			
Male IPD 2017	18	58	0.8534	0.2419	3.01
Female IPD 2017	4	11			
Male IPD 2016	13	30	1.396	0.6037	3.23
Male IPD 2017	18	58			
Female IPD 2016	6	11	1.5	0.3293	6.832
Female IPD 2017	4	11			
Male OPD 2016	34	104	0.7544	0.3538	1.609
Male IPD 2016	13	30			
Male OPD 2017	46	128	1.158	0.6186	2.168
Male IPD 2017	18	58			
Female OPD 2016	193	379	0.9336	0.3402	2.562
Female IPD 2016	6	11			
Female OPD 2017	211	512	1.133	0.3569	3.599
Female IPD 2017	4	11			

*To calculate odds ratio, 0 was taken as 0.5.

Other hormones were excluded since assays for those were not conducted in the study duration. Odds ratios were calculated using numbers of patients who had abnormal results versus normal results using parameters of Sex – male/female, Department – OPD/IPD, Year – 2016/2017.

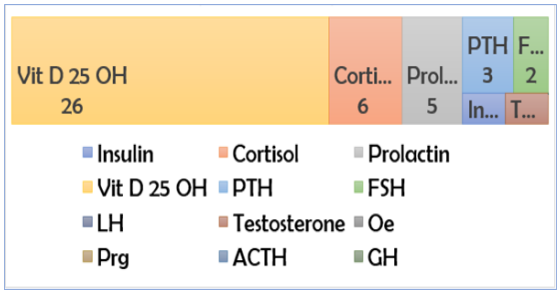

Figure 1: Total number of assays done in 2016 and 2017.

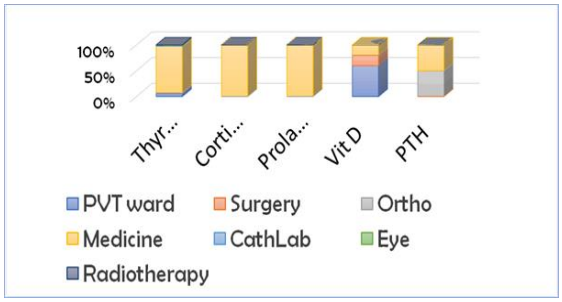

Figure 2: Distribution of different endocrine assay among male wards.

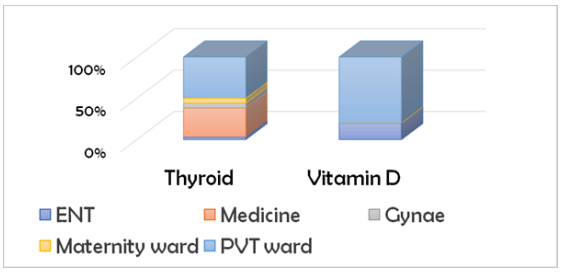

Figure 3: Distribution of different endocrine assay among female wards.

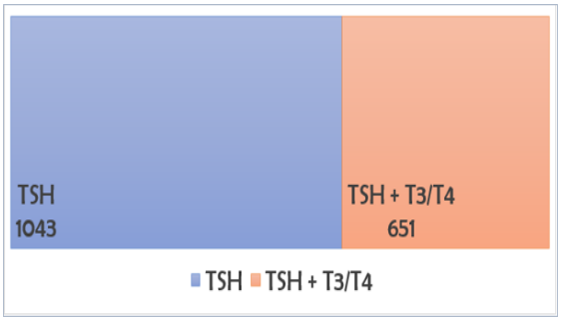

Figure 4: Thyroid assays done in 2016 and 2017.

DISCUSSION

This study was aimed at surveying and compiling data regarding the epidemiology of endocrine and metabolic disorders. It involved retrospectively analysing the obtained data methodically so as to make available information and statistics that would be invaluable in the rational setting of priorities in view of the limited resources allocated for management of these disorders.

In accordance with, Hut-Mossel et al,[10] the data was synthesized in a five step process which involved organizing the extracted data into tables, theming, forming and linking chains of inference and then presenting it. The results of the laboratory based clinical audit by Imoh et al,[11] were used to change pre analytical practices in the laboratory and this reaffirmed the utility of such studies prompting the need of a post analytical study as well.

A study by Ladusingh et al,[12] found out of pocket expenditure to be highest for non-communicable diseases and that it is the need of the hour to expand the outreach of the public health system to rural areas. However, in our setup, the number of insured male as well as female patients were more as compared to those without health coverage in both years.

The findings obtained in our study were similar to the epidemiology of thyroid disorders as reported in a study conducted by Nagarkar et al.[13] The prevalence was found to be more in females than males. The odds ratio indicated that males were 0.64 times more likely to have a thyroid disorder than females. The age group for which thyroid hormone investigations done were most was also found to be >30 years which was similar to that reported by Nagarkar et al.[13]

For Vitamin D assays, our findings were in accordance with the study conducted by Mithal et al,[14] which concluded that assays were more common in females of older age group.
Unlike the study conducted by Soto-Pedre et al,[15] which reported the parathormone assays were ordered more in females corresponding to a higher number of cases of both hyperparathyroidism and hypoparathyroidism in females, our audit indicated that more assays were done for males as compared to females.
Similar to a study by Melton et al,[16] we concluded that prolactin assay was done more for females, moreover those of the reproductive age group. This study helps us gain an insight into the trends followed by some endocrine abnormalities in patients of a tertiary care centre in Central India. They throw light upon the burden of disease on the community as well as on the out-of-pocket expenditure contributed to by abnormal levels of thyroid hormone and Vitamin D which emphasise that our focus during screening for early diagnosis as well as while formulating policies should be these hormones. It is also of importance to the hospital administration since they must consider the trends of disease during prioritisation for resource allocation. However, the same study must be conducted at a larger scale across multiple hospitals before we take any further steps to combat these diseases.

CONCLUSION

This study helps us gain an insight into the trends followed by some endocrine abnormalities in patients of a tertiary care centre in Central India. They throw light upon the burden of disease on the community that our focus during screening for early diagnosis as well as while formulating policies should be these hormones.

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REFERENCES

1. Anumah FO. Challenges of endocrinology practice in Nigeria: four illustrative cases. Ann Afr Med. 2008 Mar;7(1):38–41.
2. Unnikrishnan AG, Menon UV. Thyroid disorders in India: An epidemiological perspective. Indian journal of endocrinology and metabolism. 2011 Jul;15(Suppl2):S78.
3. Misra A, Vikram NK. Insulin resistance syndrome (metabolic syndrome) and obesity in Asian Indians: evidence and implications. Nutrition. 2004 May 1;20 (5):482-91.
4. Golden SH, Brown A, Cauley JA, Chin MH, Gary-Webb TL, Kim C, Sosa JA, Sumner AE, Anton B. Health disparities in endocrine disorders: biological, clinical, and nonclinical factors—an Endocrine Society scientific statement. The Journal of Clinical Endocrinology & Metabolism. 2012 Sep 1;97(9):E1579-639.
5. Lopez A. D., Mathers C., Ezzati M. Global Burden of Disease and Risk Factors. Washington, DC, USA: The World Bank and Oxford University Press; 2006.
6. Anyanwu A. C., Odeniyi I. A., Fasanmade O. A., et al. Endocrine-related diseases in the emergency unit of a Tertiary Health Care Center in Lagos: a study of the admission and mortality patterns. Nigerian Medical Journal. 2010;54(4):254–257. doi: 10.4103/0300-1652.119651.
7. Sarfo-Kantanka O, Sarfo FS, Ansah EO, Kyei I. Spectrum of Endocrine Disorders in Central Ghana. International journal of endocrinology. 2017;2017.
8. Kumar S, Aggarwal V, Kumar KH. Monitoring of noncommunicable diseases. J Soc Health Diabetes 2016;4:85-9.
9. Whitfield M. D., Gillett M., Holmes M., Ogden E. Predicting the impact of population level risk reduction in cardio-vascular disease and stroke on acute hospital admission rates over a 5 year period—a pilot study. Public Health. 2006;120(12):1140–1148. doi: 10.1016/j.puhe.2006.10.012.
10. Hut-Mossel L, Welker G, Ahaus K, Gans R. Understanding how and why audits work: protocol for a realist review of audit programmes to improve hospital care. BMJ open. 2017 Jun 1;7(6):e015121.
11. Imoh LC, Mutale M, Parker CT, Erasmus RT, Zemlin AE. Laboratory-based clinical audit as a tool for continual improvement: an example from CSF chemistry turnaround

time audit in a South-African teaching hospital. Biochemia medica: Biochemia medica. 2016 Jun 15;26(2):194-201.
12. Ladusingh L, Mohanty SK, Thangjam M. Triple burden of disease and out of pocket healthcare expenditure of women in India. PloS one. 2018 May 10;13(5):e0196835.
13. Nagarkar R, Roy S, Akheel M, Palwe V, Kulkarni N, Pandit P. Incidence of thyroid disorders in India: An institutional retrospective analysis. International Journal of Dental and Medical Speciality. 2015 Apr 1;2(2):19.
14. Mithal A, Wahl DA, Bonjour JP, Burckhardt P, Dawson-Hughes B, Eisman JA, Fuleihan GE, Josse RG, Lips P, Morales-Torres J, IOF Committee of Scientific Advisors (CSA) Nutrition Working Group. Global vitamin D status and determinants of hypovitaminosis D. Osteoporosis international. 2009 Nov 1;20(11):1807-20.
15. Soto-Pedre E, Newey PJ, Bevan JS, Greig N, Leese GP, The epidemiology of hyperprolactinaemia over 20 years in the Tayside region of Scotland: the Prolactin Epidemiology, Audit and Research Study (PROLEARS), Clin Endocrinol (Oxf). 2017 Jan; 86(1):60-67.
16. Melton III LJ. Epidemiology of primary hyperparathyroidism. Journal of Bone and Mineral Research. 1991 Oct;6(S2):S25-30.

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