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Advancements in Pulmonary Disease Management and Coexisting Conditions

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Abstract:- Objective: By comparing the presence of medical departments and the accessibility of diagnostic tools, the main goal of this study is to evaluate and contrast the healthcare services provided by MMC and DHQ. It also seeks to examine patient referral trends with regard to gender and destination (MMC or PESH). The study looks for differences in referral patterns and healthcare access across the two medical centers.

Methods: Before starting the investigation, ethical permission was obtained. The period of data collecting was September 2021 to September 2022. Referred patients to the Pulmonology OPD were routinely assessed. Data were gathered using diagnostic tests in accordance with the World Health Organization's guidelines for lung illnesses. In the analysis, secondary and tertiary care departments each participated. To glean useful insights and spot trends and connections, data analysis was carried out using SPSS version 24.

Results: The study found that while both MMC and DHQ had a pulmonology department, DHQ does not have an ENT or gastroenterology department. In general, MMC provides a wider selection of diagnostic tools than DHQ. While DHQ lacks a number of cutting-edge diagnostic instruments, MMC contains technology that can be used for bronchoscopy, CT scan, MRI, echo, endo bronchal ultrasound, and more. A sizable number of recommendations were made to MMC, especially in the departments of gastroenterology, emergency medicine, and pulmonary medicine. There are different referral percentages, but a sizable fraction goes to MMC. The fact that more patients were referred to MMC (239) than to DHQ (189), demonstrates the significance of MMC as a location for medical referrals.

Conclusion: The differences in healthcare services between MMC and DHQ are highlighted by this study. DHQ falls short in several areas while MMC has a greater selection of medical departments and diagnostic tools. Additionally, patient referral trends show a preference for MMC, highlighting the requirement for fair access to healthcare. These findings highlight possible areas for expanding healthcare access and infrastructure, which will eventually improve patient care and optimise the healthcare system.

Keywords*: Tertiary Care, Secondary Care, Pulmonology, MRI, CT-Scan, Referrals*

I. INTRODUCTION

Although it is most often used to refer to two illnesses that have an impact on one another, the term “comorbidities” can also refer to diseases that occur at the same time[1]. Numerous coexisting conditions often affect the clinical severity, care, or intensity of asthma[2]. To tell comorbidity from a coexisting ailment, however, can be difficult. These two things are different from one another since the former

affects the pathophysiology of asthma and causes asthma exacerbations; whereas the latter does not. Both must be correctly identified and handled in any event. The quality of life decreases clinically significantly with each additional comorbidity[3]. Asthmatic individuals had comorbidities at far higher rates than non-asthmatic patients, according to a number of population-based retrospective studies employing health administrative data. When compared to people with mild-to-moderate diseases or the general population, they are more prevalent in people with severe asthma. They can either be pulmonary or extra pulmonary in character. The prevalence of comorbidities in asthmatic patients varies across research; however it is often greater in older asthmatic women, former smokers, and prednisone-dependent asthma patients[4-8].These results underline the necessity of further investigation into the causes of the issue, the actual impact of comorbidities on the course and severity of asthma, the mechanisms by which they may have an impact, and the consequences for asthma therapy[9]. Upper and lower respiratory tracts are specifically affected by respiratory tract/comorbidities. Upper respiratory tract conditions are always linked to asthma include obstructive sleep apnea, allergic rhinitis, chronic rhino sinusitis, nasal polyposis, and vocal cord dysfunction, inducible laryngeal blockage. Lower respiratory tract conditions include dysfunctional breathing, chronic obstructive pulmonary disease and bronchiectasis as comorbid. Obese people with severe asthma frequently have obstructive sleep apnea, which worsens their condition and impairs their ability to control their asthma. In people with severe asthma, obstructive sleep apnea prevalence can be as high as 90%. However, it is still unclear how the two entities interact. Two mechanisms that may cause bronchoconstriction include increased vagal tone resulting in airway hyper responsiveness and repeated oxidative stress at bronchial level via hypoxia and hyper oxygenation. The first line treatments for obstructive sleep apnea in adults and children, continuous positive airway pressure and adeno-tonsillectomy, have strong links to improved asthma therapy[10]. The majority of asthma patients also experience seasonal or year-round allergic rhinitis symptoms. As a result, some people think of combined asthma and allergic rhinitis syndrome-a condition that mostly shows up as a type2 immunological response as the simultaneous existence of allergic rhinitis and asthma as single problem[11]. Both allergic rhinitis and asthma are characterized by inflammatory cell infiltrates and comparable causes. The lymphoid network and anatomical, physiological, pathogenic, clinical and immunological similarities between the upper and lower respiratory tracts allow them to respond similarly to airborne allergens by activating effector cells. Both allergic rhinitis and asthma are immunoglobulin (ige) mediated diseases that are brought on by similar allergens and have similar inflammatory and pathophysiological mechanisms. Other theories for the nose-lung relationship include autonomic imbalance caused by modifications in the neuronal tone of effector tissues. For instance, neural activation in the nose can cause smooth muscle of the air way to contract and the release of cholinergic neurotransmitter. Additionally the etiology of both diseases may be influenced by neuropeptide release, interactions with cellular recruitment, increased lower airway exposure to airborne pollutants via mouth breathing and increased demand for conditioning of the inspired air[12]. In any event, analysis of IgE polysensitization to numerous aeroallergen components showed that asthma and rhinitis share a shared IgE sensitivity to pollen and indoor allergens rather just rhinitis alone[13]. Regardless of how severe their asthma is, allergic rhinitis is common in asthmatics. For instance. U-BIOPRED cohort predicted that 55% of patients with severe asthma and 60% with non-severe asthma allergic rhinitis. Regardless of how severe their asthma is, allergic rhinitis is common in asthmatics. The SAPALDIA investigation revealed similarities between the inflammatory patterns of allergic rhinitis and asthma, in which T-lymphocytes and eosinophil's predominates. Rhinitis, however, is also typical in non-allergic asthma[14-16]. Asthma is substantially more likely to occur in those with allergic rhinitis who are exposed to perennial allergens as opposed to seasonal allergens. To reduce the risks of developing acute asthma exacerbations, patients with asthma and allergic rhinitis must get adequate therapy with inhaled corticosteroids or second generation antihistamines[17]. A set of disease known as "dysfunctional breathing" are characterized by a recurrent change in the biochemical respiratory rhythm that results in pulmonary and extra-pulmonary symptoms, which may be uncomfortable for the mind. Additionally, stress can increase the sensitivity of vulnerable people's airways or directly cause bronchoconstriction by stimulating the vagus nerve[18].

II. METHODOLOGY

This cross-sectional study was methodically carried out over a one-year period, from September 2021 to September 2022, after receiving ethical approval. The Pulmonology Outpatient Department's (OPD) complete review of patients referred from secondary care facilities as well as from other OPDs within the same hospital was the main focus of the study. The main goal was to determine whether further study was necessary and, concurrently, to examine the effectiveness of their treatment plans in order to determine whether there was room for additional research. The study scrupulously followed the diagnostic standards established by the World Health Organization (WHO) to obtain a comprehensive view of pulmonology-related disorders. This criterion was methodically used to compile data from a wide range of sources, mostly from different diagnostic tests. A detailed analysis of both secondary and tertiary care investigations was done within the hospital's jurisdiction to find trends and linkages. Data analysis was done using the Statistical Package for Social Sciences (SPSS), version 24, to verify the reliability and accuracy of the results. This statistical method allowed for a thorough analysis of the gathered data, enabling the extraction of significant insights and the identification of relevant study and intervention areas. The methodological strategy used in this study sought to adhere to the highest

standards of rigor and accuracy, advancing knowledge in the field of pulmonology in the process.

III. RESULTS

- *Following Data was Assessed for the Study*

Table 1: Evaluation of Departments

DEAPRTMENTS	MMC	DHQ
PULMONOLOGY	PRESENT	PRESENT
E.N.T	PRESENT	ABSENT
GASTROENTROLOGY	PRESENT	ABSENT

Table 2: Diagnostic Tools

EQUIPMENT FOR INVESTIGATIONS	MARDAN MEDICAL COMPLEX	DISTRICT HEAD QUARTER HOSPITAL
BRONCHOSCOPY	APPLICABLE	NOT APPLICABLE
CT SCAN	APPLICABLE	APPLICABLE
MRI	APPLICABLE	NOT APPLICABLE
ECHO	APPLICABLE	APPLICABLE
ENDO BRONCAL ULTRASOUND	APPLICABLE	NOT APPLICABLE
ENDO BRONCHIAL VALVE THERAPY	NOT APPLICABLE	NOT APPLICABLE
EXHALED NITRIC OXIDE TEST	NOT APPLICABLE	NOT APPLICABLE
LUNG VOLUME REDUCTION SURGERY	NOT APPLICABLE	NOT APPLICABLE
OXYGEN THERAPY LIQUID	APPLICABLE	NOT APPLICABLE
METHACHOLINE CHALLENGE TEST	NOT APPLICABLE	NOT APPLICABLE
PULMONARY REHABILITATION	NOT APPLICABLE	NOT APPLICABLE
CARDIO THORACIC SURGERY	IN PROGRESS	NOT APPLICABLE
ENDOSCOPY GI	APPLICABLE	APPLICABLE IN OPD CASES
MRCP	APPLICABLE	NOT APPLICABLE
ERCP	APPLICABLE	NOT APPLICABLE
ABGS MACHINE	APPLICABLE	NOT APPLICABLE
ICU	APPLICABLE	NOT APPLICABLE

Table 3: Referral Details With In District

REFERAL		MALE	FEMALE	PERCENTAGES
PULMO	MMC	57(23.84%)	20(8.36%)	30.96%
	PESH	12(6.34%)	19(10.05%)	58.73%
E.N.T	MMC	44(18.41%)	13(5.43%)	32.21%
	PESH	8(4.23%)	1(0.5%)	16.40%
GASTRO	MMC	63(26.39%)	11(4.60%)	23.84%
	PESH	78(41.26%)	33(17.46%)	4.76%
ADVANCE PROCEDURE	MMC	22(9.20%)	9(3.76%)	12.97%
	PESH	31(16.40%)	7(3.70%)	20.10%

Table 4: Referral Details towards Tertiary Care

CITY	REFERRAL
TOWARD MMC	239
TOWARD PESH	189

IV. DISCUSSION

The existence or absence of particular departments and pieces of technology in MMC and DHQ draws attention to inequalities in healthcare delivery. In comparison to DHQ, MMC appears to provide a greater range of specialized medical services and equipment. The referral data shows that MMC receives a sizable number of referrals from patients in various departments, including both male and female patients. PESH (perhaps another healthcare center) also gets recommendations, though at a lower rate. This can be as a result of the advanced tools and services provided by MMC. The table 1 lists whether departments are present or not in MMC and DHQ. The Pulmonology department is obviously present at both locations, but the E.N.T. and gastroenterology departments are only present in MMC and not at DHQ. Comorbid disorders make it more difficult to manage pulmonary illness in all age groups and can have a big impact on asthma control, the persistence of symptoms and even the disease natural course. Comorbidities must be identified and

treated especially when treating asthma that is difficult to control. However it has not yet been established whether treating comorbidities will enhance asthma control, whether doing so will lower their prevalence or whether doing so will change how asthma medicine is administered. Secondary care hospital is first referral from basic unit where If any relevant department with investigations equipment not available creates difficult situation for the patient which may endanger its life. These intricate difficulties should be the subject of additional prospective investigations. Departmental referrals are subjective to availability to treat the patient or investigate the underling case easily. Mardan medical complex having all the relevant departments with all the required investigations equipment's, which helps all the referral patients from DHQ mardan for their better treatment. Medical equipment is listed in table 2 along with its applicability to MMC and DHQ. It demonstrates that while DHQ lacks many of these cutting-edge diagnostic tools, MMC generally has a greater range of investigative equipment available, including bronchoscopy, MRI, endo bronchal ultrasonography, and others. However this review adopted an empirical methodology and lacked reliable evidence about any connections between asthma and associated comorbidities. Infact it is yet known what causes the comorbidities that are connected with asthma. For the creation of a successful cure to address these links understanding is essential. Due to the diversity of asthma, this will not be a straightforward approach. We can now identify a variety of endo phenotypes[19]. Since systematic inflammation is a typical occurrence in several of these conditions, including at least some specific asthma endo phenol types, it may represent a potential relationship between extra pulmonary comorbidities and asthma. Numerous mediators, including IL-6 and asymmetric dimethylarginine, an inhibitor of all nitric oxide synthase isoforms, have been associated with asthma and a range of comorbidities, including obesity, cardiovascular diseases, and psychiatric disorders. This suggests that in addition to disease-specific mediators, mediators that drive systemic inflammation may play a significant role in the cluster of illnesses that are comorbidities of asthma[20]. However it is still unclear whether low-grade systemic inflammation influences the lung parenchyma locally and either infiltrates or worsens air way inflammation. Anti-inflammatory medication may reduce the occurrence of comorbidities if inflammation affects the systemic circulation. Relevance of reactive oxygen species and mitochondrial dysfunction, both of which are common in obesity, diabetes and asthma in inflammation activation[21]. Important in the development of novel T2-low asthma treatments, especially for steroid-refractory severe asthma associated with comorbidities including obesity and diabetes and neutrophil inflammation. This table 3 provides information on patient referrals made to MMC or PESH (likely another medical facility) based on gender and department. The ratios show how referrals are split between MMC and PESH for each department. For instance, MMC received 30.96% of male referrals and 58.73% of female referrals in the department of pulmonology, compared to PESH, which received 6.34% of male referrals and 10.05% of female referrals. Table 4 gives a summary of patient referrals from the city and reveals that 189 patients were sent to PESH while 239 patients were sent to MMC. There is proof that azithromycin and other macrolide antibiotics may affect NLRP3 responses. Early endoscopic and non-endoscopic investigation for many types of disorders is made possible by modern gear. The use of Mrcp, Ercp, Mri, CT scans, and other technologies has improved treatment. The most crucial facility that must be present in every hospital is the intensive care unit. The World Health Organization has made the best medical care for all people a fundamental human right. Teaching hospitals should have access to the most advanced technology and systems to ensure that no patients are sent to Peshawar. More patients are referred to MMC than to PESH, according to city referral data, underscoring MMC's significance in the healthcare system. It appears that referral patterns vary depending on gender. For instance, more male patients are referred to PESH whereas more female patients are referred to MMC in the department of pulmonology. It can be useful to customize healthcare treatments by being aware of these gender-based trends.

V. CONCLUSION

Both MMC and DHQ contain departments for pulmonology, while DHQ lacks departments for ENT and gastroenterology, showing variations in the range of medical specializations offered. Compared to DHQ, MMC has a wider variety of diagnostic tools at its disposal. MMC possesses the necessary instruments for a variety of studies, but DHQ is missing some crucial diagnostic equipment. Its importance as a destination for healthcare referrals is demonstrated by the huge number of referrals MMC receives from other departments. Contrarily, DHQ obtains less recommendation, which may indicate variations in the caliber of healthcare services offered. The fact that MMC receives more patient referrals (239) than DHQ (189), demonstrating its status as the area's top hospital, than DHQ.

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