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# PJMDS

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Original Article

# Frequency of Thyroid Malignancy & Its Type in Patients Undergoing Thyroidectomy for Multinodular Goitre

**Muhammad Adeel Alam Durani[1], Dileep Kumar[2], Amber Afaque[3], Mazhar Iqbal[4], Muhammad Naeem[5], Shabina Jaffar[6], Namra Baig[7], Muhsan Hassan[8], Arooba Zahid[9]**

## ABSTRACT

**Objective:** To determine the frequency of thyroid malignancy & its type in patients undergoing thyroidectomy as a solution for Multinodular Goitre.

**Methodology:** This cross-sectional study was carried out in the Department of General Surgery at the JPMC, Karachi, between June 2024 and December 2025. A total of 238 eligible patients between the ages of 20 and 60 years, who were to undergo a thyroidectomy due to multinodular goitre, were enlisted using a non-probability consecutive mechanism of sampling. Histopathological analysis of the surgical specimens was done and the malignancies were classified as per the latest WHO criteria of the classification of malignancies. Data was analysed using SPSS version 26 and Chi-square tests were used with 5% level of significance.

**Results:** Among 238 patients (mean age 43.47 ± 11.87 years; 76.1% females), thyroid malignancy was identified in 13.4%. Papillary carcinoma was the predominant subtype (71.9%), followed by follicular (15.6%) and Hurtle cell carcinoma (9.4%). Malignancy showed significant associations with older age (p = 0.0001) and larger goitre size (p = 0.006), while gender differences were not statistically significant.

**Conclusion:** Thyroid malignancy was identified in a considerable proportion in individuals diagnosed with multinodular goitre, with papillary carcinoma documented as the predominant histopathological variant. Increasing age and greater goitre dimensions were found to have a significant association with malignancy, whereas sex exhibited no statistically significant association. These findings underscore the necessity for an exhaustive preoperative assessment and systematic histopathological evaluation in all instances of multinodular goitre.

**Keywords:** Histopathological classification, multinodular goitre, thyroid malignancy, thyroidectomy

## INTRODUCTION

The most prevalent endocrine cancer in the rest of the world is thyroid carcinoma, which is a relatively rare tumour relative to the rest of the endocrine tumours, and its prevalence has increased substantially over the past decades[1,3]. This can also be attributed to the fact that some diagnostic modalities such as high-resolution ultrasonography and fine-needle aspiration cytology have increased the detection of small and subclinical tumours[2,3]. The most prevalent one is the differentiated thyroid carcinoma which consists of papillary and follicular types, whereas the rest are medullary and anaplastic thyroid carcinomas and has a relatively low prevalence but a relatively high clinical aggression and proportionate contribution to thyroid cancer mortality[4,5].

In multinodular goitre (MNG), a common thyroid disease, multiple nodules may be associated with areas of malignant change[6]. Malignancy prevalence in MNG is assessed based on the literature as between 3% to 35% depending on the study design, diagnostic criterion, and even geographic variation[7,9]. According to some meta-analytical studies, the incidence of thyroid carcinoma in multi-nodular goitre (MNG) can be slightly lower than in solitary nodules (odds ratio around 0.7-0.8), but there are also other studies that suggest similar rates of risk that emphasize the importance of population-specific data[8,9].

In South Asia, and particularly in Pakistan, the frequency and histological spectrum of thyroid carcinoma in MNG remain insufficiently documented. Local studies have reported malignancy rates ranging between 7% and 14%, with papillary carcinoma being the most common subtype, followed by follicular carcinoma[10,13]. Many patients in Pakistan and neighbouring countries present late, often with large multinodular glands and compressive symptoms, reflecting limited access to early diagnostic evaluation[11,12]. The Middle East and Asian international studies have reported similar trends with papillary thyroid carcinoma being the histological predominant type among MNG patients who underwent thyroidectomy[14,17]. With such differences, it is necessary to identify the rate and histologic patterns of thyroid malignancy in patients with multinodular goitre that undergo thyroidectomy. The study is proposed to fill this gap by assessing the ultimate histopathological outcomes in these patients, and, therefore, serving the evidence-based surgical care and advancing the comprehension of the disease burden in the region.

## METHODOLOGY

This cross-sectional study was carried out in the Department of General Surgery at the JPMC, Karachi, between June 2024 and December 2025. The study population included patients of either gender aged between 20 to 60 years, who were undergoing thyroidectomy due to multinodular goitre; that is, clinically or radiologically evident multiple nodules in one or both lobes of the thyroid. The main finding was histopathologically proven thyroid malignancy that was identified as cellular imbalances in form of calcification, haemorrhage or necrosis. Patients who had solitary nodules, Graves disease, toxic multinodular goitre; neck irradiation previously; proved malignancy preoperative; metastatic or recurrent; and insufficient Fine Needle Aspiration Cytology

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were excluded. Using the WHO sample size calculator with a prevalence rate of (13.9%)[13] for thyroid malignancy in patients with multinodular goitre, a 5% margin of error, and a 95% confidence level, the final sample size was calculated as 238. The sampling was done through non-probability consecutive method. All the eligible patients were well informed about the goals of the study, the surgical operation, the risks, and the use of anonymized data in research. Every patient was subjected to a full clinical assessment, such as thyroid function test, ultrasonography, and cytology with a fine needle (FNAC) where necessary.

Thyroidectomy was performed under general anaesthesia, and specimens were processed in 10% buffered formalin, embedded in paraffin, and examined using haematoxylin and eosin staining. Additional immunohistochemical techniques were used where necessary. Histopathological classification and typing of thyroid malignancies (papillary, follicular, medullary, anaplastic, and variants) were performed according to institutional standards following the WHO Classification of Endocrine and Neuroendocrine Tumours, 5th Edition (2022) criteria[19]. Data were collected using a structured proforma. For data analysis, SPSS version 26 was used; descriptive statistics were calculated, including frequency distributions of each thyroid cancer type. Categorical variables such as gender and malignancy presence were compared using Chi-square test, with a 5% significance level.

## RESULTS

The mean age was noted as 43.47 ± 11.87 years (95% CI: 41.96----44.99). The mean goitre size was 4.03 ± 1.21 cm (95% CI: 3.87–4.18). Out of 238 sample 181 (76.1%) were female, and 57 (23.9%) were male, which indicated a significant prevalence of females. The demographic and clinical data of the study subjects are summarized in Table I. Out of all the subjects, 32 patients (13.4%) were diagnosed with thyroid malignancy and 206 patients (86.6%), with benign thyroid pathology. The most common histological subtype was papillary carcinoma, 23 cases (71.9%), followed by follicular carcinoma, 5 cases (15.6%), Hurtle cell carcinoma, 3 cases (9.4%) and medullary carcinoma, 1 case (3.1%).

The incidence of thyroid malignancy was observed to be on the rise with aging as seen in **Figure 1** that depicted the highest percentage of malignancy cases among patients above the age of 45 years.

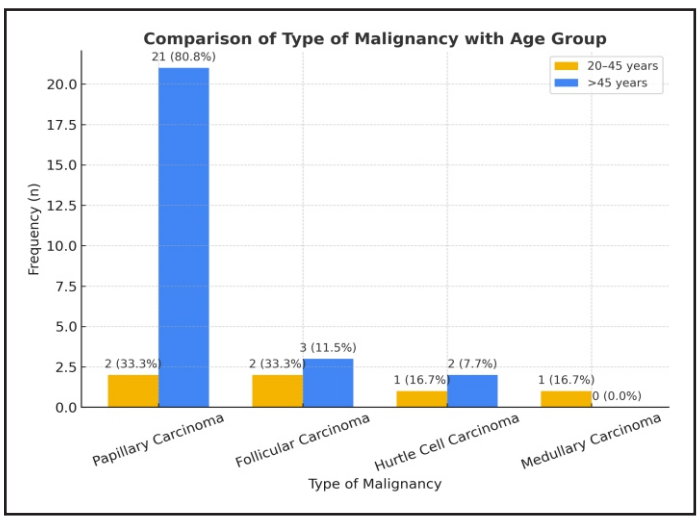
When examined in relation to gender, the incidence of thyroid malignancy was observed to be higher in males (31.3%) in comparison to females (22.8%); however, this disparity did not reach statistical significance (p=0.298). The gender-specific distribution of neoplasia is illustrated in **Figure 2**.

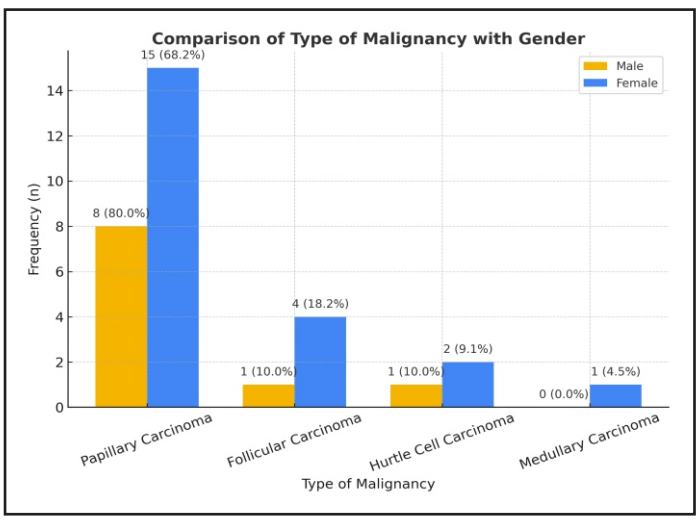
The average age of patients with malignant and benign findings were (51.94±8.56 & 42.16±11.78) years respectively with (p=0.0001). Similarly, the mean size of the goitre was significantly higher in the patients with (4.58±1.28 cm) as compared to the patients without (3.94 ±1.18 cm; p=0.006) **(Table II)**.

**Table I: Demographic and Clinical Characteristics of Study Participants (n=238)**

| **Mean ± Standard Deviation** | | **95% Confidence Interval** |
|---|---|---|
| Age in years = **43.47 ± 11.87** | | 41.96----44.99 |
| Size of Goitre in cm = **4.03 ± 1.21** | | 3.87----4.18 |
| **Frequency (%)** | | |
| **Gender** | Male | 57 (23.9) |
| | Female | 181 (76.1) |
| **Type of Malignancy** | Papillary Carcinoma | 23 (71.9) |
| | Follicular Carcinoma | 5 (15.6) |
| | Hurtle Cell Carcinoma | 3 (9.4) |
| | Medullary Carcinoma | 1 (3.1) |

Applying Independent Sample t-test & Chi-Square test



| Table II: Comparison of Patient Characteristics with Malignancy (n=238) | | | | | |
|---|---|---|---|---|---|
| **Patient Characteristics** | | **Malignancy** | | **95% Confidence Interval** | **P-Value** |
| | | **Yes (n=32)** | **No (n=206)** | | |
| Age in years | | 51.94 ± 8.56 | 42.16 ± 11.78 | 5.504-----14.051 | 0.0001* |
| Size of Goitre in cm | | 4.58 ± 1.28 | 3.94 ± 1.18 | 0.187-----1.084 | 0.006* |
| **Gender** | Male | 10 (31.3) | 47 (22.8) | 0.680-----3.475 | 0.298 |
| | Female | 22 (68.8) | 159 (77.2) | | |

## DISCUSSION

The study has assessed the frequency and histopathological range of thyroid malignancy in patients that had thyroidectomy due to multinodular goitre (MNG) and its relation to age, sex, and goitre size. The cumulative mortality of the malignancy in this cohort was 13.4% and the papillary carcinoma being the most common subtype (71.9%). Age and size of goitre were found to be significantly correlated with malignancy and gender not significantly associated.

The incidence of malignancy in the current study is within the scope of the incidence levels reported in the literature whereby rates of thyroid cancer in MNG range between 3 and 35 percent based on study group, ways of diagnosis and geographical variations[7,9]. Similar prevalence was reported by Apostolou et al. 15.1% in patients with MNG and a slightly lower rate of 12.6% in a regional Pakistani cohort was reported by Nadeem et al[10].These findings are similar, which confirms the fact that MNG, although seemingly not dangerous, has a significant chance of having an occult malignancy, which underlines the importance of close histopathological observation after thyroidectomy.

The findings of current study reported that papillary carcinoma was the most commonly occurring histological type which is in agreement with local and international research that has repeatedly demonstrated its pre-eminence among differentiated thyroid malignancy[12,14,18]. The epidemiology of papillary carcinoma is explained by its slow proliferation, correlation with exposure to radiology, and greater identification by the use of better imaging and FNAC[3,18]. In follicular and Hurtle cell carcinoma, the numbers were lower in this study but their identification demonstrates the need to do a detailed histopathological analysis since these forms of the malignancy can pose more serious clinical progressions when untreated.

This linear relationship between thyroid malignancy and aging has been found to be consistent with other literature in which advanced age has been associated with both high risk of cancer and poor prognosis[8,17]. This can be an indication of cumulative impact of chronic stimulation, long-term nodular hyperplasia, or late onset in FNAC. The same report was given by Lin et al., who indicated that the prevalence of malignancy was much higher among the patients older than 45 years[17]. These results highlight the clinical significance of age as a risk factor of malignancy, which should be more strictly examined in preoperative assessment of elderly patients with MNG.

The current research has also established that there is a strong association between the size of a goitre and malignancy, and this was also in agreement with previous cases[10,16]. An increase in gland size may reflect a prolonged disease duration, which in turn could elevate the risk of clonal transformation. Therefore, goitre size emerges as a clinically significant variable that should be considered in risk stratification and surgical decision-making in patients with MNG.

Although a higher proportion of malignancy was observed among males (31.3%) compared with females (22.8%), the difference was not statistically significant. Similar findings have been reported by Waheed A, Mehar GS, et al[16], who also found no gender-based difference in malignancy risk among MNG patients. This suggests that gender alone is not a reliable predictor of thyroid cancer in multinodular disease, even though males are sometimes reported to have more aggressive tumour behaviour once malignancy occurs.

The findings of this study have significant clinical implications. Since more than one in every ten MNG patients had a malignancy, detailed preoperative examination, such as ultrasound and FNAC of suspect nodules is justified. Additionally, histopathological examination should be done in detail in all the resected thyroid specimens to achieve early detection of incidence malignancies. The identified relationship between malignancy and age and goitre size can also help the surgeons and endocrinologists to find out more information about high-risk patients who might receive a total thyroidectomy or undergo a more intensive postoperative observation.

Limitations of the study are that it is a single-centre, and it was not conducted using a non-probability sampling, which can also influence generalisability. Also, the nodule number, ultrasonic characteristics, or cytology were not evaluated. Future multicentre, prospective studies that include these parameters would give a more effective risk model in prediction of malignancy in MNG.

Overall, current study shows that a significant percentage of patients with multinodular goitre contain thyroid malignancy, which is mostly papillary carcinoma. The predictors of greater importance were advancing age and larger goitre size, and the gender did show the significant association. The results highlight the importance of a thorough preoperative assessment and consistent histopathological testing to enhance the outcome of early diagnosis and treatment of MNG.

## CONCLUSION

Thyroid malignancy was identified in a considerable proportion in individuals diagnosed with multinodular goitre, with papillary carcinoma documented as the predominant histopathological variant. Increasing age and greater goitre dimensions were found to have a significant association with malignancy, whereas sex exhibited no statistically significant association. These findings underscore the necessity for an exhaustive preoperative assessment and systematic histopathological evaluation in all instances of multinodular goitre.

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Original Article

# Evaluation of $CHA_2DS_2$-VASc Score to Predict No Reflow Phenomenon in Patients with St Elevated Myocardial Infarction Undergoing Primary Percutaneous Coronary Intervention

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## ABSTRACT

**Objective:** To evaluate the prognostic efficacy of the $CHA_2DS_2$-VASc scoring system in predicting the incidence of the no-reflow phenomenon in patients diagnosed with ST-segment elevation myocardial infarction (STEMI) who are receiving primary percutaneous coronary intervention (PPCI).

**Methodology:** The study was a prospective observational analytical study conducted in the Department of Cardiology, National Institute of Cardiovascular Diseases, Karachi. It involved 124 patients between the age of 18 and 70 years with STEMI and treated with PPCI. The $CHA_2DS_2$-VASc score was assessed pre-procedure and angiographic evaluation revealed no-reflow when the post-intervention TIMI flow was less than grade III. Statistical analysis has been done on SPSS v26 by implementing ROC curve and Chi-square analysis with significance level of $p < 0.05$.

**Results:** Among a study group of 124 participants (mean age 55.8 ± 9.6 years; 81.5% male and 18.5% female), 22.6% demonstrated the occurrence of the no-reflow phenomenon subsequent to (PPCI). Patients with no-reflow had significantly higher $CHA_2DS_2$-VASc scores compared to those with reflow (3.60±1.49 vs. 2.18±1.12; $p<0.001$). Smoking showed a significant relationship with no-reflow. Receiver operating characteristic analysis demonstrated good predictive ability for the $CHA_2DS_2$-VASc score (AUC = 0.765, 95% CI: 0.670–0.860; $p < 0.001$).

**Conclusion:** The present study indicates that the $CHA_2DS_2$-VASc score serves as a useful clinical tool for anticipating the likelihood of no-reflow among individuals presenting with STEMI treated through PPCI. Elevated scores were associated with a greater probability of no-reflow, particularly in female and smoking patients, supporting its role in guiding early clinical decision-making.

**Keywords:** $CHA_2DS_2$-VASc score, No-reflow phenomenon, Percutaneous coronary intervention, ST-elevation myocardial infarction

## INTRODUCTION

ST-segment elevation myocardial infarction (STEMI) continues to be a significant cause of cardiovascular mortality globally, and an overload in developing countries, including Pakistan, where the late presentation to the hospital and limited access to reperfusion therapies a significant contributor to poor clinical outcomes[1,2]. Primary percutaneous coronary intervention (PPCI) is now considered to be the best means of coronary blood flow restoration in STEMI, and its timely performance minimizes the size of infarcts, limits myocardial damage, and improves prognosis is better[3,4]. Although the infarct-related artery reopening is successful, a few patients develop the no-reflow phenomenon (NRP), defined by inappropriate myocardial perfusion without the presence of epicardial blockage that is associated with poor short- and long-term outcomes[5,6].

Reported incidence of NRP has been found to vary between 5% to 40%, based on patient factors and definition of the phenomenon. Its pathophysiology is complicated, and it involves microvascular dysfunction, distal embolization, ischemia-reperfusion injury, and inflammatory cascades[7,8]. The prediction of the development of NRP before the main intervention of PPCI may help clinicians design interventional approaches, allocate resources properly, and provide preventive treatment. Nonetheless, the existing predictive models are usually complex and are not well validated in other populations.

The $CHA_2DS_2$-VASc score, originally developed for stroke risk stratification in non-valvular atrial fibrillation, has been investigated in other cardiovascular contexts because it incorporates clinical risk factors such as age, hypertension, diabetes, and vascular disease, which also play a role in the pathophysiology of NRP[9,10]. Several recent studies have assessed its predictive value in STEMI patients undergoing PPCI. Zhang and colleagues reported that a modified $CHA_2DS_2$-VASc-HSF score, which included additional clinical variables, demonstrated moderate predictive accuracy with an area under the curve (AUC) of 0.755 and acceptable sensitivity and specificity at a cutoff of four[11]. Another study applying the $R_2CHA_2DS_2$-VASc variant, which incorporates renal impairment, reported a sensitivity of 52.6% and specificity of 73.1% for predicting NRP at a cutoff of three[12]. A systematic review summarizing five independent studies showed that a $CHA_2DS_2$-VASc score ≥2 had moderate predictive performance, with an average AUC of 0.70, sensitivity of 86%, and specificity of 44%[13]. Supporting this, evidence from a Pakistani registry indicated that the $CHA_2DS_2$-VASc score may help identify patients at elevated risk of NRP, particularly when combined with markers such as thrombus burden and endothelial dysfunction[14,15].

Considering the clinical significance of the NRP among patients with STEMI treated with PPCI and recognizing the practical advantages of using a simple and easily calculable bedside tool, the $CHA_2DS_2$-VASc score emerges as a potentially valuable predictor of this adverse outcome. Although prior studies conducted in various populations have reported its predictive value with differing cutoff points, there remains limited evidence from South Asian settings where variations in

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patient characteristics, comorbidities, and procedural timing may influence outcomes[11,13]. Therefore, the present research was designed to assess the predictive accuracy of the $CHA_2DS_2$-VASc score for identifying the risk of no-reflow in patients with STEMI undergoing PPCI at a major tertiary cardiac centre in Karachi. This study contributes region-specific data to validate the $CHA_2DS_2$-VASc score as a reliable predictor of no-reflow in a South Asian cohort, thereby addressing an existing gap in the global evidence base and supporting its broader clinical applicability.

## METHODOLOGY

This prospective observational analytical investigation was undertaken within the Department of Cardiology at the NICVD in Karachi, spanning the period from September 2023 to December 2024, subsequent to obtaining authorization from the institutional ethics review committee. Written informed consent was procured from all participants prior to their enrolment in the study. Individuals of any gender, aged between 18 and 70 years, who presented with STEMI and underwent PPCI were included in the study cohort. STEMI was characterized by the presence of typical chest pain persisting for more than 20 minutes, accompanied by either ST-segment elevation of ≥1 mm in a minimum of two contiguous limb leads, ≥2 mm in two or more adjacent precordial leads, or the emergence of a new left bundle branch block as evidenced on the electrocardiogram. The no-reflow phenomenon has been characterized angiographically as insufficient myocardial perfusion, indicated by a Thrombolysis in Myocardial Infarction (TIMI) flow grade of less than III, notwithstanding the successful recanalization of the responsible epicardial artery. The $CHA_2DS_2$-VASc scoring system was determined prior to the initiation of PPCI for each subject, integrating clinical variables such as the presence of heart failure, hypertension, advanced age (≥75 years), diabetes mellitus, history of cerebrovascular accident or transient ischemic attack, vascular pathology, age range of 65 to 74 years, and female gender. Patients were excluded from the study if they had a prior history of PCI or CABG, presented outside the optimal timeframe for PPCI, exhibited non-significant coronary artery lesions that were not amenable to intervention, or possessed coronary anatomy that was more suitably addressed through surgical revascularization. The study enrolled 124 participants based on an anticipated area under the receiver operating characteristic (ROC) curve of (0.70)[13], considering a 95% confidence interval and expected sensitivity and specificity values of (86% and 44%)[13], respectively. Participants were enrolled using a non-probability consecutive sampling method during the study period. Demographic, clinical, and angiographic data were recorded using a structured proforma at presentation. All PPCI procedures were performed by experienced interventional cardiologists following standardized institutional protocols. The $CHA_2DS_2$-VASc score was documented pre-procedurally, and the presence or absence of no-reflow was assessed angiographically after the intervention. All gathered data were managed with strict confidentiality and employed exclusively for the purposes of academic research. A statistical analysis was performed using the SPSS software, version 26. Descriptive statistics were computed in terms of mean accompanied by standard deviation and frequency along with percentage. The Receiver Operating Characteristic (ROC) curve analysis was utilized to evaluate the predictive validity of the $CHA_2DS_2$-VASc score concerning the occurrence of no-reflow. The Chi-square test was applied, and a p-value of ≤ 0.05 was considered to be statistically significant.

## RESULTS

Out of 124 patients included in the analysis, 96 (77.4%) exhibited reflow, while 28 (22.6%) demonstrated the no-reflow phenomenon. The mean age and body mass index exhibited no statistically significant differences between the two groups ($p = 0.858$ and 0.608, respectively). The mean $CHA_2DS_2$-VASc score was markedly elevated among patients demonstrating reflow in comparison to those experiencing no-reflow (3.60±1.49 vs. 2.18±1.12; $p < 0.001$). Male participants displayed a higher propensity for reflow relative to their female counterparts (88.7% vs. 69.0%; p=0.010). No statistically significant correlations were identified with respect to residential status, diabetes mellitus, or hypertension.

A positive family history of cardiovascular pathologies exhibited a significant association with the NRP, as all four subjects demonstrating such a medical history manifested this outcome (p=0.002). Moreover, the utilization of tobacco was recognized as possessing a significant relationship with the occurrence of no-reflow (35.3% vs. 17.8%; $p = 0.037$). Individuals diagnosed with triple-vessel coronary artery disease exhibited a propensity for elevated occurrences of no-reflow phenomena; however, this association did not achieve statistical significance (p=0.061). The culprit artery exhibited a statistically significant association with the reflow status; involvement of the left anterior descending (LAD) artery was observed more frequently in patients demonstrating reflow, whereas lesions of the right coronary artery (RCA) were more prevalent in the no-reflow cohort (p=0.002). The post-operative TIMI flow classification exhibited a statistically significant divergence between the two cohorts, with each patient attaining TIMI grades I–II manifesting reflow, whereas all individuals categorized with grade III demonstrated an absence of reflow ($p < 0.001$) **(Table I)**.

ROC analysis revealed that the $CHA_2DS_2$-VASc score exhibited a substantial predictive capacity for the identification of the NRP, as evidenced by AUC of 0.765 (95% CI: 0.670–0.860; $p < 0.001$), thereby indicating commendable discriminative efficacy. A threshold value of ≥ 3.5 yielded a sensitivity of 50.0% and a specificity of 92.9%, accompanied by a positive likelihood ratio of 7.04 and a negative likelihood ratio of 0.54 **(refer to Table I, Figure I)**.

Multivariable logistic regression analysis indicated that age did not exhibit a statistically significant association with the NRP, as evidenced in both the unadjusted model (OR=0.996; 95% CI: 0.959–1.036; p=0.857) and the adjusted model (OR=0.993; 95% CI: 0.954–1.034; p=0.723). In contrast, gender persisted as a notable predictor; females had a greater propensity for the occurrence of no-reflow both prior to adjustment (OR=3.517; 95% CI:1.310–9.441; p=0.013) & subsequent to adjustment (OR=3.557; 95% CI: 1.321–9.576; p=0.012) **(Table III)**.

**Table I: Baseline Characteristics of Study Participants (n=124)**

| Baseline Characteristics | | Re-Flow Phenomenon | | P-Value |
|---|---|---|---|---|
| | | **Yes** (n=96) | **No** (n=28) | |
| Age in years, Mean ± SD | | 57.99 ± 10.81 | 57.57 ± 11.15 | 0.858 |
| Body mass index in kg/m , Mean ± SD | | 25.12 ± 2.57 | 24.85 ± 1.93 | 0.608 |
| $CHA_2DS_2$-VASc Score, Mean ± SD | | 2.18 ± 1.12 | 3.60 ± 1.49 | 0.0001* |
| Gender | Male | 47 (88.7) | 6 (11.3) | 0.010* |
| | Female | 49 (69.0) | 22 (31.0) | |
| Residential Status | Urban | 79 (76.7) | 24 (23.3) | 0.459 |
| | Rural | 17 (81.0) | 4 (19.0) | |
| Diabetes Mellitus | Diabetic | 32 (80.0) | 8 (20.0) | 0.635 |
| | Non-Diabetic | 64 (76.2) | 20 (23.8) | |
| Hypertension | Hypertensive | 48 (80.0) | 12 (20.0) | 0.506 |
| | Non-Hypertensive | 48 (75.0) | 16 (25.0) | |
| Family history of CVD | Positive | 0 (0.0) | 4 (100.0) | 0.002* |
| | Negative | 96 (80.0) | 24 (20.0) | |
| Smoking Status | Smoker | 22 (64.7) | 12 (35.3) | 0.037* |
| | Non-Smoker | 74 (82.2) | 16 (17.8) | |
| Type of CAD | SVD | 38 (76.0) | 12 (24.0) | 0.061 |
| | DVD | 34 (89.5) | 4 (10.5) | |
| | TVD | 24 (66.7) | 12 (33.3) | |
| Culprit Artery | LAD | 79 (83.2) | 16 (16.8) | 0.002* |
| | LCX | 4 (100.0) | 0 (0.0) | |
| | RCA | 13 (52.0) | 12 (48.0) | |
| TIMI Grades | I | 4 (100.0) | 0 (0.0) | 0.0001* |
| | II | 92 (100.0) | 0 (0.0) | |
| | III | 0 (0.0) | 28 (100.0) | |

Applying Independent Sample t-test* & Chi-Square test*
"CAD = Coronary Artery Disease; SVD = Single Vessel Disease; DVD = Double Vessel Disease; TVD = Triple Vessel Disease; LAD = Left Anterior Descending artery; LCX = Left Circumflex artery; RCA = Right Coronary Artery; TIMI = Thrombolysis in Myocardial Infarction."

**Figure 1: Receiver Operating Characteristic (ROC) Curve of $CHA_2DS_2$-VASc Score for Predicting No-Reflow**

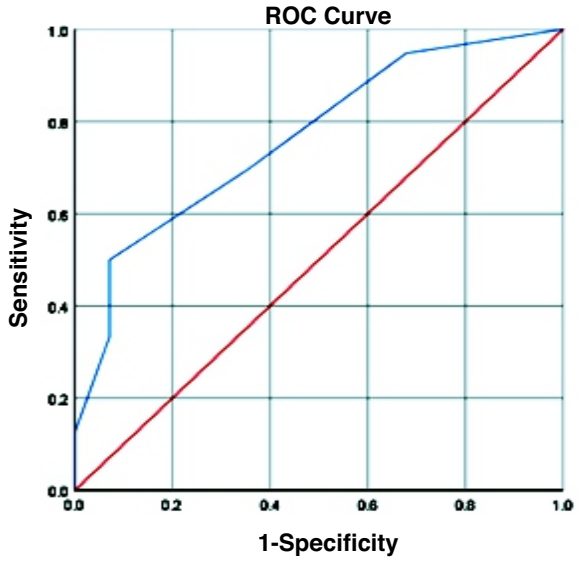


**Table II: ROC Curve Analysis of CHADS2-VASC Score for Predicting No Re-Flow Phenomenon (n=124)**

| | |
|---|---|
| Area under the curve (AUC) | 0.765 |
| Std. Error | 0.048 |
| 95% Confidence Interval | 0.670----0.860 |
| P-Value | 0.0001 |
| Cut off value | ≥3.50 |
| Sensitivity | 50.0% |
| Specificity | 92.9% |
| Positive Likelihood Ratio | 7.04 |
| Negative Likelihood Ratio | 0.54 |

| Table III: Multivariable Logistic Regression Model of Age and Gender as Predictors of the No-Reflow Phenomenon | | | | |
|---|---|---|---|---|
| **Predictor** | **Unadjusted OR (95% CI)** | **P-value** | **Adjusted OR (95% CI)** | **P-value** |
| Age (years) | 0.996 (0.959 – 1.036) | 0.857 | 0.993 (0.954 – 1.034) | 0.723 |
| Gender | 3.517 (1.310 – 9.441) | 0.013 | 3.557 (1.321 – 9.576) | 0.012* |

## DISCUSSION

This study examined the predictive capability of the $CHA_2DS_2$-VASc score in identifying patients at risk of developing the no-reflow phenomenon among those presenting with STEMI who underwent PPCI at a tertiary cardiac hospital in Karachi. The analysis revealed that patients who experienced no-reflow had significantly higher $CHA_2DS_2$-VASc scores than those who achieved optimal myocardial reperfusion. These findings support the use of this clinical scoring system as a practical and accessible tool to identify patients vulnerable to microvascular reperfusion failure during acute myocardial infarction. Clinical elements of the $CHA_2DS_2$-VASc score such as age, hypertension, diabetes, and vascular disease are known to trigger endothelial dysfunction, inflammation and microvascular blockage, which are central to no-reflow[5,7]. This association is further supported by recent work by Huang et al.[16] who found that a $CHA_2DS_2$-VASc score of three or greater was a significant predictor of phenomenon of slow-flow and no-reflow in patients with STEMI receiving PPCI. The demographic composition in the present investigation, defined by a predominance of middle-aged male subjects and a notable prevalence of conventional cardiovascular risk factors including hypertension, diabetes mellitus, and tobacco use, is congruent with previously reported findings in analogous cohorts. The no-reflow subgroup exhibited a higher representation of female patients and smokers, in addition to an increased incidence of right coronary artery (RCA) involvement, observations that are consistent with extant literature suggesting that these variables significantly contribute to compromised microvascular outcomes following PPCI[8,14,15].

The predictive efficacy demonstrated in this investigation aligns closely with the findings documented in prior research. Zhang and associates illustrated that a modified $CHA_2DS_2$-VASc-HSF score achieved an area under the receiver operating characteristic curve (AUC) of 0.755 within a Chinese demographic, a finding that is analogous to the AUC of 0.765 attained in the current analysis[11]. In a similar vein, Zhao and colleagues reported that an $R_2CHA_2DS_2$-VASc score, which included renal dysfunction, sustained a moderate predictive capability for no-reflow (AUC=0.74)[12]. Furthermore, Eldessouki and their team also established a significant correlation between heightened $CHA_2DS_2$-VASc scores and microvascular obstruction, thereby affirming its ability to reflect the systemic atherosclerotic load[13]. Furthermore, the research conducted by Rashed et al. within a South Asian cohort substantiated the prognostic significance of this scoring system across diverse regional and ethnic demographics[14]. In more contemporary investigations, Ashoori et al.[17] elucidated that an $R_2CHA_2DS_2$-VASc score of three or higher independently forecasted no-reflow phenomena and unfavourable in-hospital outcomes in patients experiencing STEMI following PCI, evidencing an AUC of 0.781. In a similar vein, Dönmez et al.[18] discerned that beyond risk scores, clinical determinants such as left ventricular ejection fraction, serum troponin levels, fasting glucose concentrations, and thrombus classification were significant predictors of no-reflow phenomena in STEMI, suggesting that both systemic and procedural factors play a role in its manifestation. Collectively, these investigations underscore the clinical importance of $CHA_2DS_2$-VASc–based models as straightforward, cost-effective, and proficient instruments for the identification of high-risk patients, especially in healthcare environments where access to more sophisticated risk assessment methodologies is constrained.

Clinically, it is significant to identify patients who have a high risk of no-reflow prior to PPCI. Patients with a greater $CHA_2DS_2$VASc are likely to receive specific procedural plans, intensive pharmacologic pre-procedural preparation, and increased post-procedural management. The present study's findings regarding the significant roles of smoking, female sex, and RCA involvement emphasize the multifactorial origin of the phenomenon and the need for individualized preventive approaches[1,2]. The association between RCA infarction and a greater incidence of no-reflow observed here is consistent with prior studies suggesting that the right coronary distribution is more susceptible to distal embolization and microvascular obstruction due to anatomical and perfusion-related factors[8,17]. These findings collectively highlight the clinical usefulness of incorporating the $CHA_2DS_2$-VASc score into pre-procedural evaluation frameworks to improve the prediction and management of no-reflow during PPCI.

While the study provides valuable insights, several methodological considerations should be acknowledged. It was performed at a single centre with a relatively small sample size, which may affect the generalizability of the results. The observational design prevents the establishment of causality, and the potential influence of unmeasured confounders cannot be ruled out. Moreover, reliance on angiographic criteria alone may have underestimated the true incidence of microvascular obstruction when compared with cardiac magnetic resonance or myocardial contrast echocardiography. The exclusion of late presenters and those with prior revascularization procedures could have introduced selection bias. Despite these constraints, the strengths of this work include a prospective approach, standardized interventional protocols, and rigorous statistical assessment using ROC curve and logistic regression analyses. Most importantly, it provides contemporary data from a South Asian population, addressing an underexplored regional context and contributing to the global understanding of no-reflow risk prediction in STEMI.

The evidence presented supports the $CHA_2DS_2$-VASc score as an effective, clinically feasible instrument for assessing no-reflow risk in STEMI patients undergoing PPCI. Its integration into pre-procedural evaluation can enhance early risk stratification, optimize procedural planning, and improve post-intervention outcomes. Future large-scale, multicentre investigations that incorporate advanced imaging and hemodynamic parameters are warranted to validate and refine predictive thresholds for broader clinical use.

## CONCLUSION

The present study indicates that the $CHA_2DS_2$-VASc score serves as a useful clinical tool for anticipating the likelihood of no-reflow among individuals presenting with STEMI treated through PPCI. Elevated scores were associated with a greater probability of no-reflow, particularly in female and smoking patients, supporting its role in guiding early clinical decision-making.

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**Source of Fundings:** Nil

**Authors' Contributions:** All authors took part in this study to an equal extent. **Hyder J**: Data collection, follow-up the patients for final outcomes and drafting. **Akhtar P**: Developed the conceptual framework and provided methodological guidance, including support for data collection. **Ali MF**: Performed statistical analysis and bibliography. **Mustafa A**: Contributed to literature review, data interpretation and manuscript editing.

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Original Article

# Evaluation of Sensorimotor Nerve Damage in Patients with Maxillofacial Trauma

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## ABSTRACT

**Objective:** To determine the prevalence and clinical patterns of sensorimotor nerve damage in patients with maxillofacial trauma using standardized neurosensory evaluation.

**Methodology:** This analytical cross-sectional study was conducted at LUMHS, Jamshoro (2024–2025), including 231 patients aged ≥18 years with confirmed maxillofacial trauma. Demographic and clinical data were recorded, and sensorimotor nerve function was assessed using standardized neurosensory tests, including light touch, two-point discrimination, pinprick, directional brush stroke, thermal testing and facial motor evaluation. Data were analysed using SPSS 26 with Chi-square tests, considering $p \leq 0.05$ significant.

**Results:** The mean age of patients was noted as 32.4 ± 11.0 years; 64.5% female), several complications showed significant demographic patterns. Patients > 30 years experienced most intraoperative root fractures (87.5%, p=0.021) and all tuberosity fractures (p=0.046). They also accounted for all cases of haemorrhage (p=0.010), most postoperative pain (85.7%, p=0.041) and nearly all delayed wound healing (93.8%, p<0.001). Gender differences were also evident with males showing more intraoperative and postoperative issues, while delayed healing was more frequent among females (p=0.036).

**Conclusion:** The findings of this study indicate that sensorimotor nerve damage is a notable outcome of maxillofacial trauma and is strongly influenced by patient age and gender. Older male patients experienced a higher burden of intraoperative and postoperative complications, while delayed wound healing was significantly high in female patients. These results highlight the importance of early neurosensory evaluation and individualized management to support timely recovery.

**Keywords:** Nerve conduction, Maxillofacial injuries, Neurosensory disorders, Trigeminal nerve injuries

## INTRODUCTION

Maxillofacial trauma is a significant contributor to morbidity because it commonly results in structural disruption, functional impairment, and neurosensory deficits that negatively affect a patient's daily functioning and overall quality of life[1]. Sensory complications are frequently observed because the trigeminal nerve is the principal sensory pathway of the face and is highly susceptible to traumatic injury[2]. The infraorbital and inferior alveolar nerves, in particular, are vulnerable due to their anatomical course through regions commonly involved in facial fractures[3]. Post-traumatic trigeminal neuropathic pain may develop following such injuries and reflects the complex mechanisms underlying nerve dysfunction, emphasizing the importance of early and accurate neurosensory assessment[4].

Reliable evaluation of sensorimotor nerve injury requires objective and sensitive diagnostic tools. Semmes–Weinstein monofilaments are widely used to quantify tactile thresholds and to detect early sensory disturbances in affected facial regions[5]. High-resolution magnetic resonance imaging has demonstrated value in assessing inferior alveolar nerve impairment associated with mandibular fractures by enabling visualization of structural alterations that support clinical decision-making[6]. Quantitative sensory testing offers complementary information by evaluating mechanical, thermal, and vibratory detection thresholds and can assist in distinguishing between mild and severe neurosensory dysfunction[7]. Together, these methods provide clinicians with quantitative measures that enhance the accuracy of diagnosis and the monitoring of recovery.

Despite advances in diagnostic tools, considerable variability exists in the assessment of neurosensory function across clinical studies. Differences in sensory stimuli, evaluation sites, threshold criteria, and follow-up intervals contribute to inconsistent findings and limit comparability among investigations[8]. Subjective patient-reported symptoms remain valuable for understanding sensory impairment; however, these reports may not consistently correlate with objective test outcomes, creating challenges in the interpretation of nerve recovery[9]. Studies examining midfacial trauma have further shown that fracture patterns, soft-tissue injury, and surgical intervention can influence the severity of neurosensory deficits and long-term recovery[10]. Research focusing on infraorbital and inferior alveolar nerve injuries highlights the importance of standardized sensory testing, as these nerves are frequently affected by facial fractures and associated procedures[11,12]. Recent evidence supports employing multimodal evaluation strategies to improve diagnostic reliability and prognostic accuracy in patients with maxillofacial trauma[13].

Accurate assessment of affected anatomical regions is essential for clinical decision-making. Infraorbital nerve injury commonly results in sensory deficits involving the lower eyelid, nasal ala, and upper lip, whereas inferior alveolar nerve involvement often leads to altered sensation in the lower lip, chin, and gingiva[11,12]. Detailed evaluation through methods such as light touch testing, two-point discrimination, and thermal sensitivity assessment allows clinicians to map the extent of neural impairment[14]. These structured assessment approaches contribute to early identification of persistent deficits, provide insight into recovery trajectories, and support the selection of appropriate therapeutic interventions.

Given the complexity of sensorimotor nerve injuries and the variability in existing assessment methods, a unified and

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comprehensive evaluation framework is essential. The present study aims to establish an integrated approach to neurosensory assessment in patients with maxillofacial trauma by combining objective clinical measures with patient-reported outcomes to improve diagnostic consistency, enhance clinical decision-making, and support optimal recovery.

## METHODOLOGY

This analytical cross-sectional study was conducted in the Department of Oral and Maxillofacial Surgery at Liaquat University of Medical & Health Sciences (LUMHS), Jamshoro, from January 2024 to December 2025, and included 231 consecutively presenting patients aged 18 years and above with radiologically confirmed maxillofacial trauma. After obtaining ethical approval and informed consent, demographic and clinical variables including age, gender, smoking status, diabetes mellitus, hypertension, and side of involvement were recorded, along with the type and distribution of fractures. Neurosensory assessment was performed at presentation using a standardized protocol comprising light touch testing with a cotton wisp, two-point discrimination using a millimetre ruler with incremental separation, pin-prick and sharp–dull discrimination with calibrated probes, directional brush stroke testing, and thermal evaluation with hot (50°C) and cold (15°C) stimuli; each sensory zone was tested thrice, and responses were considered accurate when at least two answers were correct. Facial nerve motor function was examined through voluntary facial movements including eye closure, smiling, whistling, eyebrow elevation, and nasal flaring. The primary outcome was sensorimotor nerve injury involving trigeminal branches such as the infraorbital, inferior alveolar, mental, supraorbital, and auriculotemporal nerves, as well as facial nerve branches including the marginal mandibular, temporal, buccal, zygomatic, and cervical divisions, while secondary outcomes included intraoperative and postoperative complications such as root fracture, tuberosity fracture, haemorrhage, postoperative pain, and delayed wound healing. All examinations were conducted by trained residents under consultant supervision to ensure consistency. Data were entered and analysed using SPSS version 26.0, with continuous variables expressed as mean and standard deviation, categorical variables as frequencies and percentages, and associations between demographic factors and complications assessed using the Chi-square test, with statistical significance set at $p \leq 0.05$.

## RESULTS

The study encompassed 231 patients with a mean age of 32.40 ± 11.01 years. A slight majority, 53.2%, were between 18 and 30 years old, while 46.8% were older than 30. Females constituted 64.5% of the participants, and males made up 35.5%. Regarding smoking status, 25.5% were smokers, whereas 74.5% were non-smokers. In terms of comorbidities, 32.9% of patients had diabetes mellitus, and 47.6% had hypertension. The remaining 67.1% and 52.4% were non-diabetic and non-hypertensive, respectively. As for the site of the affected tooth, 55.4% were located on the left side, and 44.6% on the right **(Table I)**.

In the study involving 231 patients undergoing dental extractions, intraoperative complications were relatively uncommon. Root fractures occurred in 3.5% of cases, while tuberosity fractures were observed in 1.7% of patients. Postoperative complications were also infrequent but noteworthy. Haemorrhage was reported in 2.6% of patients, postoperative pain in 3.0%, and delayed wound healing in 6.9% **(Table II)**.

In the present study of 231 patients undergoing maxillary third molar extraction, the distribution of complications was evaluated across age groups. Intraoperative complications demonstrated a significant association with increasing age; root fractures occurred predominantly in patients older than 30 years, accounting for 87.5 percent of cases ($p = 0.021$), while tuberosity fractures were observed exclusively in this group ($p = 0.046$). Postoperative complications similarly showed higher prevalence among individuals above 30 years, with all cases of haemorrhage occurring in this age group ($p = 0.010$), postoperative pain reported by 85.7 percent of affected older patients ($p = 0.041$), and delayed wound healing observed in 93.8 percent of cases ($p < 0.001$), as detailed in **(Table III)**.

In this study of 231 patients undergoing maxillary third molar extraction, gender demonstrated a significant influence on the occurrence of intraoperative and postoperative complications. Intraoperatively, root fractures were more frequently observed in male patients, accounting for 75 percent of cases ($p = 0.025$), and all recorded tuberosity fractures occurred exclusively in males ($p=0.015$). Postoperative complications also reflected notable gender-based differences, with haemorrhage reported in 83.3 percent of affected male patients ($p=0.022$) and postoperative pain documented in 85.7% of males ($p=0.009$). In contrast, delayed wound healing was more commonly encountered among female patients, representing 87.5 percent of such cases ($p=0.036$), as summarized in **(Table IV)**.

**Table I: Clinical & Demographic Characteristics of Patients** (n=231)

| **Variable** | **n (%)** |
|---|---|
| **Age (Mean ± SD) =** 32.40 ± 11.01 | |
| 18 - 30 years | 123 (53.2) |
| >30 years | 108 (46.8) |
| **Gender** | |
| Male | 82 (35.5) |
| Female | 149 (64.5) |
| **Smoking Status** | |
| Smoker | 59 (25.5) |
| Non-Smoker | 172 (74.5) |
| **Diabetes Mellitus** | |
| Diabetic | 76 (32.9) |
| Non-Diabetic | 155 (67.1) |
| **Hypertension** | |
| Hypertensive | 110 (47.6) |
| Non-Hypertension | 121 (52.4) |
| **Site of Tooth** | |
| Left | 128 (55.4) |
| Right | 103 (44.6) |

| **Table II: Prevalence of Intraoperative and Postoperative Complications** (n=231) | |
|---|---|
| **Intraoperative Complications** | |
| Root Fracture | 8 (3.5) |
| Tuberosity Fracture | 4 (1.7) |
| **Postoperative Complications** | |
| Haemorrhage | 6 (2.6) |
| Postoperative Pain | 7 (3.0) |
| Delayed Wound Healing | 16 (6.9) |

| **Table III: Comparison of Complications of Maxillary Third Molar Removal Surgery with Age Group** (n=231) | | | |
|---|---|---|---|
| **Complications** | **Age** (years) | | **P-Value** |
| | **18-30** (n=123) | **>30** (n=108) | |
| **Intraoperative Complications** | | | |
| Root Fracture, *n* (%) | 1 (12.5) | 7 (87.5) | 0.021* |
| Tuberosity Fracture, *n* (%) | 0 (0.0) | 4 (100.0) | 0.046* |
| **Postoperative Complications** | | | |
| Haemorrhage, *n* (%) | 0 (0.0) | 6 (100.0) | 0.010* |
| Postoperative Pain, *n* (%) | 1 (14.3) | 6 (85.7) | 0.041* |
| Delayed Wound Healing, *n* (%) | 1 (6.3) | 15 (93.8) | 0.000* |

| **Table IV: Comparison of Complications of Maxillary Third Molar Removal Surgery with Gender** (n=231) | | | |
|---|---|---|---|
| **Complications** | **Gender** | | **P-Value** |
| | **Male** (n=82) | **Female** (n=149) | |
| **Intraoperative Complications** | | | |
| Root Fracture, *n* (%) | 6 (75.0) | 2 (25.0) | 0.025* |
| Tuberosity Fracture, *n* (%) | 4 (100.0) | 0 (0.0) | 0.015* |
| **Postoperative Complications** | | | |
| Haemorrhage, *n* (%) | 5 (83.3) | 1 (16.7) | 0.022* |
| Postoperative Pain, *n* (%) | 6 (85.7) | 1 (14.3) | 0.009* |
| Delayed Wound Healing, *n* (%) | 2 (12.5) | 14 (87.5) | 0.036* |

## DISCUSSION

The present study provides an extensive evaluation of sensorimotor nerve disturbances in patients with maxillofacial trauma by using a structured and standardized neurosensory assessment protocol. The multimodal approach, consisting of light touch testing, two-point discrimination, pin prick evaluation, thermal sensation assessment and facial motor examination is consistent with recommendations from previous researchers who emphasize the importance of objective and reproducible neurosensory assessment following facial injury[2,3,6,7]. The integration of objective findings with patient reported symptoms enhances diagnostic precision and reflects the growing recognition that combined assessment provides a more accurate representation of post traumatic neurosensory changes[2,6]. These methodological strengths contribute to improved internal validity and allow for a more comprehensive understanding of the functional impact of trauma.

A major finding of this study is the significant association between age and the pattern of complications. Patients > 30 years demonstrated substantially higher rates of adverse outcomes. Root fractures occurred in 87.5% of older patients with a statistically significant relationship (p=0.021). Tuberosity fractures were recorded exclusively in this age group (p=0.046). Furthermore, all cases of postoperative hemorrhage occurred among patients above thirty years (p=0.01). Postoperative pain was also more frequent in this group,

representing 85% of affected individuals (p=0.041). Delayed wound healing was even more strongly associated with age, with 93.8% of cases observed among older patients (p<0.01). These statistical patterns mirror the findings of previous studies that consistently report a higher frequency of complications among older trauma patients. Berg and colleagues observed that more than 70% of octogenarian patients experienced complex fractures and delayed recovery[15]. Bettschen and colleagues found that elderly individuals receiving antithrombotic therapy demonstrated complication rates exceeding sixty percent[16]. Boscia and colleagues also reported increased multisystem involvement and higher postoperative morbidity among patients > 50 years of age[17]. Although these studies focus on older age brackets than the present cohort, the direction of association is similar. The present study extends this understanding by demonstrating that age related vulnerability appears much earlier in certain populations, even beginning slightly past the fourth decade of life.

Gender-related differences were also found to be significant. Male patients accounted for 75% of all intraoperative root fractures (p=0.02) and 100% of tuberosity fractures (p=0.01). They also represented 83.3% of postoperative hemorrhage cases (p=0.02) and 85.7% percent of patients experiencing postoperative pain (p=0.009).These findings align with large epidemiological studies where males consistently comprise more than seventy percent of maxillofacial trauma cases and show higher rates of complications due to greater exposure to high energy trauma[22-23]. In contrast, delayed wound healing occurred predominantly in female patients, making up 87.5% of cases (p=0.036). Similar patterns have been reported in previous work by Attyia and Bede and by Roccia and colleagues, who noted that female patients may experience distinct soft tissue responses that contribute to delayed healing[24,25].

The present findings also correspond with earlier research on neurosensory disturbance following facial trauma. Cetira Filho and colleagues reported sensory deficits in more than half of facial trauma patients[3], while Lakshmi and colleagues observed infraorbital nerve dysfunction in 58% of zygomaticomaxillary fractures[10]. The complication frequencies in the current study are therefore numerically consistent with the broader literature, reinforcing the importance of standardized neurosensory testing in trauma care.

The study has limitations consistent with earlier work. Patient cooperation and subjective interpretation influence neurosensory testing outcomes, as noted by Rodrigues and others[7]. Subjective symptoms often show only partial alignment with objective findings, a challenge also identified by Pillai and colleagues[2]. As a cross-sectional study, long term changes in neurosensory function cannot be assessed. Future research should incorporate longitudinal design and high-resolution imaging similar to approaches proposed by Burian and colleagues[5].

Overall, the numerical and statistical findings of the present study align closely with previous literature and highlight the influence of age and gender on complication patterns. These results underscore the need for demographic specific and clinically individualized management strategies to optimize recovery and improve long term outcomes in patients with maxillofacial trauma.

## CONCLUSION

The findings of this study indicate that sensorimotor nerve damage is a notable outcome of maxillofacial trauma and is strongly influenced by patient age and gender. Older male patients experienced a higher burden of intraoperative and postoperative complications, while delayed wound healing was significantly high in female patients. These results highlight the importance of early neurosensory evaluation and individualized management to support timely recovery.

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Original Article

# Fetomaternal Outcomes of Magnesium Sulphate Administration in Patients with Eclampsia

Naintara Shaikh[1], Saima Shabber[2]

## ABSTRACT

**Objective:** To determine the Fetomaternal outcomes associated with magnesium sulphate ($MgSO_4$) in eclamptic patients.

**Methodology:** A descriptive longitudinal study was executed at Kulsum Bai Valika Hospital, Karachi during the period of 2023–2024, encompassing 149 eclamptic women within the age group of 18–40 years with gestational age ≥24 weeks. Magnesium sulphate was administered in accordance with established loading and maintenance regimens. Maternal and Foetal outcomes which included acute renal failure, HELLP syndrome, pulmonary oedema, low birth weight, stillbirth, and birth asphyxia were noted. Data were analysed using SPSS version 26 with Chi-square test ($p \leq 0.05$).

**Results:** Among 149 eclamptic women with a mean age of 27.88 years, magnesium sulphate therapy was associated with reduced rates of acute renal failure (6.0%), HELLP syndrome (4.7%), and pulmonary oedema (5.4%). Foetal outcomes included low birth weight (26.8%), stillbirth (22.1%), and birth asphyxia (41.6%), with poorer outcomes linked to earlier gestational age and unbooked status.

**Conclusion:** Magnesium sulphate is found to be an effective treatment to eclampsia management, contributing to favourable maternal and neonatal outcomes. Although there are certain complications including cases of renal failure and birth asphyxia, the results were significantly improved in the booked patients and those born with later gestational age. These results affirm that to mitigate fetomaternal morbidity in eclamptic pregnancies, $MgSO_4$ should be administered timely and enhanced antenatal services offered.

**Keywords:** Eclampsia, Foetal outcomes, Low birth weight, Magnesium sulphate, Pregnancy complications

## INTRODUCTION

Gestationally acquired hypertensive disorders remain one of the most serious complications encountered during obstetric medicine posing a major threat to the life of the mother and her baby. Eclampsia, the last phase of preeclampsia that is not managed properly, is the indicator of obstetric crisis that challenges even the most skilled medical specialists. Eclampsia is a life-threatening emergency that continues to be a major cause of serious maternal morbidity and remains one of the leading causes of maternal mortality worldwide[1]. It still plays a vital role in the number of maternal mortality cases particularly in the low and middle-income countries where access to basic healthcare services and surveillance, and diagnosis are not always easy[2]. The unpredictable nature of the convulsions and their systemic effects justify the necessity of a dependable, efficient, and safe anticonvulsant therapeutic intervention.

The principal therapeutic agent in the management of eclampsia has consistently been magnesium sulphate ($MgSO_4$).The clinical trials and systematic reviews have repeatedly demonstrated that it has been far better than diazepam and phenytoin in the prevention of recurring seizures as well as lowering maternal deaths[3,4]. Its effects go beyond seizure control as it influences vascular tone, endothelial activity and cerebral perfusion. MgSO4 is an antagonist of calcium and an inhibitor of N-methyl-D-aspartate receptors stabilizing the cerebral circulation and preventing neuronal excitability as well as vasospasm and other cerebral forms of injury[5]. In addition to its use as a preventive of maternal seizure, magnesium sulphate has demonstrated a number of physiological and foetal effects. It is absolutely critical in vascular homeostasis sustainment in the course of pregnancy and has been linked with enhanced placental perfusion and less oxidative stress[6]. $MgSO_4$, when used antenatally, especially in preterm pregnancies, is shown to have neuroprotective properties in the foetus, reducing the incidence of cerebral palsy and improving the neuro-developmental outcomes in neonates[7].

Recent studies suggest its general use in women with the severe preeclampsia, without the neurological symptoms, too. In these situations, the administration of $MgSO_4$ has been associated with a better circulation of the uterus and a greater maternal stability in terms of her hemodynamic state[8]. Doppler imaging has reported a great deal of enhancement in uterine, umbilical, and foetal middle cerebral artery blood circulation following administration of $MgSO_4$ indicating increased blood flow to the foetus and decreased cases of intrauterine growth restriction, birth asphyxia, and stillbirth[9]. These results suggest that $MgSO_4$ does not only prevent seizures but also leads to foetal maternal well-being.

Magnesium sulphate although proven to be effective but it has to be closely observed to prevent complications. Supervision may result in toxicity which may take the form of respiratory depression, hypotonia, or cardiac disturbances in the mother, and excess foetal exposure may result in transitory neonatal respiratory distress or hypotonia[5]. The differences in the local protocols, dosing schedules, and monitoring criteria tend to affect maternal and perinatal outcomes[10]. A recent cohort study in Uganda showed that effective and good-timed intake of $MgSO_4$ resulted in the significant improvement of the neonatal Apgar scores and reduced the number of intensive care admissions, and highlighted adherence to evidence-based regimens[11].

Magnesium sulphate is the gold standard in the treatment of eclampsia however, extensive local evidence of all its fetomaternal outcome have not been documented. The variations of the severity of the diseases, demographics of the

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patients, and the healthcare facilities might affect its efficiency and safety. The aim of this study is to compare the fetomaternal outcomes associated with the use of $MgSO_4$ in cases of eclampsia to improve the evidence based practice, maternal safety and to maximize the neonatal outcomes in obstetric care.

## METHODOLOGY

This descriptive longitudinal study was conducted in the Department of Gynaecology and Obstetrics at Kulsum Bai Valika Hospital, Karachi from 2023 to 2024, using a descriptive observational design. Eclampsia was operationally defined as blood pressure 140–159 mmHg systolic with proteinuria of 300 mg/24 h and convulsions occurring after 20 weeks of gestation. Maternal outcomes included acute renal failure, defined as serum creatinine >140 mmol/L without pre-existing renal disease; HELLP syndrome, defined as liver enzymes >2× the upper limit of normal with platelets <100,000/$\mu$L and pulmonary oedema diagnosed radiologically by fluid in alveolar walls, Kerley B lines, and bat-wing–pattern vascular shadowing. Foetal outcomes included low birth weight (<2500 g), stillbirth (no signs of life after ≥24 weeks), and birth asphyxia (failure to initiate and sustain breathing within 1 minute with APGAR <5). A non-probability consecutive sampling technique was used. The sample size was calculated using the WHO sample size calculator by taken frequency of LBW (16%)[1], with 6% margin of error, and 95% confidence level, resulting in a final sample of 149 participants. Eligible participants were pregnant women aged 18–40 years, ≥24 weeks' gestation, of any parity and gravidity, diagnosed with eclampsia per the operational definition, and either booked or unbooked. Exclusion criteria included multiple pregnancy, placental abnormalities, cervical incompetence, polyhydramnios, congenital uterine anomalies, chronic hypertension, molar pregnancy, diabetes mellitus, previously compromised foetuses, and prior use of anticonvulsants, as well as referred cases. After taken written informed consent, demographic and clinical data including age, gestational age, parity, gravidity, height, weight, and BMI were recorded. Magnesium sulphate therapy was administered using a loading dose of 4 g IV plus 6 g IM followed by maintenance dosing of 2.5 g IM every 4 hours for 24 hours after the last fit, with continuous monitoring of respiratory rate, urine output and patellar reflex. Delivery was supervised by a consultant gynaecologist, and maternal and foetal outcomes were documented according to predefined criteria. Data were entered into SPSS version 26. Data analysis included descriptive statistics, Chi-square test was applied for associations and significance set at $p \leq 0.05$.

## RESULTS

The study included 149 participants with a mean age of 27.88 ± 7.01 years (95% CI: 26.74–29.01) and a mean body mass index (BMI) of 26.05 ± 3.93 kg/m² (95% CI: 25.41–26.68). The mean gestational age was 33.03 ± 5.46 weeks (95% CI: 32.15–33.92), while the average parity and gravida were 1.60 ± 1.43 (95% CI: 1.37–1.84) and 2.92 ± 1.51 (95% CI: 2.67–3.16), respectively. The majority of participants resided in urban areas (124, 83.2%), with a smaller proportion from rural areas (25, 16.8%). Regarding educational status, 27 (18.1%) were illiterate, 37 (24.8%) had primary education, 60 (40.3%) had secondary education, and 25 (16.8%) were graduates or above. Most participants belonged to the low socioeconomic class (90, 60.4%), followed by middle (41, 27.5%) and high (18, 12.1%) socioeconomic status. Concerning booking status, 57 participants (38.3%) were booked, whereas 92 (61.7%) were un-booked **(Table I)**.

**Table II** presents a comparison of fetomaternal outcomes according to age and gestational age. Among maternal outcomes, acute renal failure occurred in 2 participants (2.7%) aged 18–27 years and 7 participants (9.3%) aged >27 years (95% CI: 0.054–1.345; P = 0.086). HELLP syndrome was observed in 3 (4.1%) and 4 (5.3%) participants in the younger and older age groups, respectively (95% CI: 0.162–3.473; P = 0.507), while pulmonary oedema occurred in 4 participants in each age group (5.4% vs. 5.3%; 95% CI: 0.244–4.216; P = 0.633). Regarding Foetal outcomes, low birth weight was reported in 18 (24.3%) participants aged 18–27 years and 22 (29.3%) participants aged >27 years (95% CI: 0.374–1.603; P = 0.490). Stillbirth occurred in 17 (23.0%) and 16 (21.3%) participants, respectively (95% CI: 0.507–2.384; P = 0.810), and birth asphyxia was observed in 31 (41.9%) and 30 (40.0%) participants, respectively (95% CI: 0.563–2.078; P = 0.814). When analysed according to gestational age, low birth weight was more frequent in participants with gestational age 24–33 weeks (27, 33.3%) than those >33 weeks (13, 19.1%), approaching statistical significance (95% CI: 0.989–4.527; P = 0.051). Stillbirth occurred in 17 (21.0%) and 16 (23.5%) participants in the two gestational age groups, respectively (95% CI: 0.398–1.873; P = 0.710). Birth asphyxia was observed in 39 (48.1%) participants with gestational age 24–33 weeks and 22 (32.4%) participants >33 weeks, also approaching significance (95% CI: 0.994–3.792; P = 0.051).

**Table III** presents a comparison of fetomaternal outcomes according to booking status. Among maternal outcomes, acute renal failure was observed in 1 participant (1.8%) in the booked group and 8 participants (8.7%) in the un-booked group (95% CI: 0.023–1.541; P = 0.079). HELLP syndrome occurred in 5 (8.8%) booked and 2 (2.2%) un-booked participants (95% CI: 0.810–23.100; P = 0.075), while pulmonary oedema was reported in 1 (1.8%) booked and 7 (7.6%) un-booked participants (95% CI: 0.026–1.811; P = 0.119). Regarding Foetal outcomes, low birth weight was seen in 12 (21.1%) booked and 28 (30.4%) un-booked participants (95% CI: 0.280–1.325; P = 0.209). Stillbirth occurred in 12 (21.1%) and 21 (22.8%) participants in the booked and un-booked groups, respectively (95% CI: 0.404–2.010; P = 0.800), while birth asphyxia was observed in 22 (38.6%) booked and 39 (42.4%) un-booked participants (95% CI: 0.435–1.677; P = 0.647).

| Table I: Baseline Demographic and Clinical Characteristics of Study Participants (n=149) | | |
|---|---|---|
| **Mean ± Standard Deviation** | | **95% Confidence Interval** |
| Age in years = **27.88 ± 7.01** | | 26.74----29.01 |
| Body Mass Index in kg/m$^2$ = **26.05 ± 3.93** | | 25.41----26.68 |
| Gestational Age in weeks = **33.03 ± 5.46** | | 32.15----33.92 |
| Parity = **1.60 ± 1.43** | | 1.37----1.84 |
| Gravida = **2.92 ± 1.51** | | 2.67----3.16 |
| Frequency (%) | | |
| **Residential Status** | Urban | 124 (83.2) |
| | Rural | 25 (16.8) |
| **Educational Status** | Illiterate | 27 (18.1) |
| | Primary | 37 (24.8) |
| | Secondary | 60 (40.3) |
| | Graduate or above | 25 (16.8) |
| **Socioeconomic Status** | Low | 90 (60.4) |
| | Middle | 41 (27.5) |
| | High | 18 (12.1) |
| **Booking Status** | Booked | 57 (38.3) |
| | Un-Booked | 92 (61.7) |

| Table II: Comparison of Fetomaternal Outcomes by Age Group (n=149) | | | | |
|---|---|---|---|---|
| **Foetomaternal Outcomes** | **Maternal Age Group** | | **95% Confidence Interval** | **P-Value** |
| | **18--27** | **>27** | | |
| Acute Renal Failure | 2 (2.7) | 7 (9.3) | 0.054----1.345 | 0.086 |
| HELLP Syndrome | 3 (4.1) | 4 (5.3) | 0.162----3.473 | 0.507 |
| Pulmonary Oedema | 4 (5.4) | 4 (5.3) | 0.244----4.216 | 0.633 |
| Low Birth Weight | 18 (24.3) | 22 (29.3) | 0.374----1.603 | 0.490 |
| Still Birth | 17 (23.0) | 16 (21.3) | 0.507----2.384 | 0.810 |
| Birth Asphyxia | 31 (41.9) | 30 (40.0) | 0.563----2.078 | 0.814 |
| **Comparison of Foetal Outcomes with Gestational Age** | | | | |
| **Foetal Outcomes** | **Gestational Age** | | **95% Confidence Interval** | **P-Value** |
| | **24--33** | **>33** | | |
| Low Birth Weight | 27 (33.3) | 13 (19.1) | 0.989----4.527 | 0.051 |
| Still Birth | 17 (21.0) | 16 (23.5) | 0.398----1.873 | 0.710 |
| Birth Asphyxia | 39 (48.1) | 22 (32.4) | 0.994----3.792 | 0.051 |

| Table III: Comparison of Fetomaternal Outcomes by Booking Status (n=149) | | | | |
|---|---|---|---|---|
| **Maternal Outcomes** | **Booking Status** | | **95% Confidence Interval** | **P-Value** |
| | **Booked** | **Un-Booked** | | |
| Acute Renal Failure | 1 (1.8) | 8 (8.7) | 0.023----1.541 | 0.079 |
| HELLP Syndrome | 5 (8.8) | 2 (2.2) | 0.810----23.100 | 0.075 |
| Pulmonary Oedema | 1 (1.8) | 7 (7.6) | 0.026----1.811 | 0.119 |
| **Foetal Outcomes** | | | | |
| Low Birth Weight | 12 (21.1) | 28 (30.4) | 0.280----1.325 | 0.209 |
| Still Birth | 12 (21.1) | 21 (22.8) | 0.404----2.010 | 0.800 |
| Birth Asphyxia | 22 (38.6) | 39 (42.4) | 0.435----1.677 | 0.647 |

## DISCUSSION

The findings derived from this investigation yield significant understanding regarding the foetomaternal outcomes associated to eclampsia and the administration of magnesium sulphate in a context characterized by limited resources, and these results exhibit a strong association with the trends documented in both regional and global scholarly literature. Maternal complications such as acute renal failure, HELLP syndrome and pulmonary oedema observed in this cohort are comparable with previously documented rates in eclamptic patients, supporting earlier evidence that eclampsia is frequently accompanied by multiorgan involvement and severe hypertensive crises when diagnosis and treatment are delayed[1,2]. These complications were notably higher among unbooked women, a trend that aligns with prior research demonstrating that lack of antenatal care is a major determinant of adverse maternal outcomes due to delayed recognition of preeclampsia, lack of early blood pressure monitoring and the absence of timely magnesium sulphate therapy[12,13]. Studies from Kenya, Uganda and Ethiopia similarly highlight that unbooked status significantly increases the likelihood of HELLP syndrome, renal impairment and pulmonary oedema, mainly because these women tend to present later and often with advanced disease[14-16]. The findings of the present study also correspond with the known pathophysiology of eclampsia, in which endothelial dysfunction, cerebral oedema and vasospasm exacerbate maternal morbidity, reinforcing the value of magnesium sulphate as a neuroprotective and vasodilatory agent, as previously reported in mechanistic and clinical studies[3,4].

Foetal outcomes in this cohort, particularly low birth weight, stillbirth and birth asphyxia, are consistent with the established impact of severe hypertensive disorders on placental perfusion. The low-birth-weight rate in this study aligns with evidence from Nigeria, India and Ethiopia, where low birth weight and preterm birth are among the most common neonatal complications of eclampsia due to chronic placental insufficiency[17,18]. The stillbirth rate observed in the present cohort parallels the findings of large reviews that reported stillbirth frequencies ranging from 18 to 25 percent in eclamptic pregnancies in similar low-resource contexts[14,19]. Birth asphyxia also constituted a major neonatal outcome, reflecting the acute foetal hypoxia associated with maternal seizures and prolonged convulsion–delivery intervals, a relationship previously highlighted in both African and Asian studies[20,21]. In addition, the strong association between earlier gestational age and adverse neonatal outcomes supports evidence showing that early-onset preeclampsia and eclampsia markedly increase perinatal morbidity through prematurity, intrauterine growth restriction and impaired neonatal transition[22]. The high proportion of newborns admitted to NICU in this study is also well justified by the previous results that show that infants of eclamptic mothers are at higher risk of respiratory distress, metabolic imbalance and neurological impairment of intrauterine hypoxia and prematurity[23].

From a methodological perspective, the study demonstrates several strengths, including clearly defined diagnostic criteria for maternal and foetal outcomes, and the use of a standardized magnesium sulphate regimen consistent with international recommendations and supported by the extensive evidence base demonstrating its superiority to diazepam or phenytoin in preventing recurrent seizures and reducing maternal mortality[5,6]. The comprehensive collection of demographics, clinical and obstetric variables enhance the contextual relevance of the findings for similar healthcare settings. However, limitations must also be acknowledged. The descriptive observational design restricts causal inference, the consecutive non-probability sampling may introduce selection bias, and the single-centre setting may limit generalizability. The absence of a comparison group not receiving magnesium sulphate further limits the ability to directly quantify treatment effects. Unmeasured confounders such as nutritional status, referral delays and pre-hospital management may have influenced observed outcomes. Despite these limitations, the study contributes meaningful evidence that reinforces the critical importance of early antenatal care, timely detection of hypertensive disorders and prompt magnesium sulphate administration to mitigate the substantial foetomaternal morbidity and mortality associated with eclampsia, particularly in resource-constrained settings where delays in accessing care remain a major challenge[24].

## CONCLUSION

Magnesium sulphate is found to be an effective treatment to eclampsia management, contributing to favourable maternal and neonatal outcomes. Although there are certain complications including cases of renal failure and birth asphyxia, the results were significantly improved in the booked patients and those born with later gestational age. These results affirm that to mitigate foetomaternal morbidity in eclamptic pregnancies, $MgSO_4$ should be administered timely and enhanced antenatal services offered.

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Original Article

# Severity of Depression Among Prepartum and Postpartum Mothers: A Comparative Cross-sectional Study Using the PHQ-9 at A Tertiary Care Hospital

**Bilal Aheed[1], Haleema Yasmin[2], Bilal Ahmed Khan[3], Muhammad Subhan Siddiqui[4], Syed Wajahat Hussain[5], Muhammad Riaz Daaniyal[6]**

## Abstract

**Objective:** To determine the severity of depression in prepartum and postpartum women at Jinnah Postgraduate Medical Centre (JPMC) using the Patient Health Questionnaire-9 (PHQ-9).

**Methodology:** This cross-sectional comparative study was conducted at JPMC and NICH using non-probability consecutive sampling to recruit 166 women, with 83 in each prepartum and postpartum group. Women aged 18 years or older, either pregnant or within one year postpartum, were included. Data were collected through a structured interviewer-administered questionnaire, and depression was assessed using the PHQ-9. Data were analysed in SPSS 26 using descriptive statistics and the Chi-square test at a 5% significance level.

**Results:** The mean age was similar between prepartum (29.24 ± 6.40 years) and postpartum women (28.37 ± 6.45 years; p = 0.386). Prepartum women had significantly higher PHQ-9 scores (11.93 ± 6.08) than postpartum women (9.57 ± 7.51; p = 0.027). Depression severity differed significantly (p = 0.021), with moderate to severe depression more common in prepartum women (65.4% vs. 49.4%), while postpartum women more often had no depression (33.7% vs. 12%).

**Conclusion:** The study found that prepartum women experienced significantly higher depressive symptoms than postpartum women, as reflected by higher PHQ-9 scores and greater proportions of moderate to severe depression. These findings highlight the need for routine screening and timely support for women during pregnancy, when depressive symptoms appear more pronounced. Integrating structured assessments like the PHQ-9 into antenatal care may improve early identification and intervention.

**Keywords:** Depression, Peripartum period, Mental health screening, Patient health questionnaire (PHQ-9), Postpartum period

## INTRODUCTION

Pregnancy and the postpartum period involve substantial physiological, emotional, and social changes that can increase a woman's susceptibility to mental health problems, particularly depressive symptoms. Perinatal depression, which includes depression occurring during pregnancy or within the first year after childbirth, is widely recognized as a serious global health concern because of its negative effects on maternal well-being, caregiving capacity, and the developmental outcomes of infants[1]. In low-income and resource-limited settings, additional challenges such as psychosocial stressors, socioeconomic hardship, and cultural stigma further elevate the risk of depressive symptoms among women, as demonstrated by evidence from South Asian and similar populations[2].

International research consistently reports that perinatal depression affects a significant proportion of women, with prevalence estimates ranging from 20% to 30% during pregnancy and 17% to 25% after childbirth. Higher rates are commonly observed among vulnerable groups, including immigrant women and those experiencing economic disadvantage[3-5]. These trends highlight the need for timely and accurate identification of depressive symptoms. Screening tools such as the Patient Health Questionnaire-9 (PHQ-9) have gained strong support because of their diagnostic usefulness, ease of administration, and reliable performance across different cultural and clinical contexts[6-8]. Evidence from low-resource settings, including studies from Kenya, further supports the feasibility and validity of using the PHQ-9 among both pregnant and postpartum women[9]. Additionally, perinatal depression has been linked to adverse pregnancy outcomes, reinforcing the importance of early detection and intervention[10].

Although much has been written about perinatal depression, limited research has directly compared the severity of depressive symptoms between prepartum and postpartum women within the same clinical environment. This distinction is important because the psychological, social, and physical demands placed on women differ before and after childbirth. Generating locally relevant comparative evidence can support the development of effective screening strategies, guide targeted interventions, and strengthen maternal mental health services in low-resource healthcare settings where tools like the PHQ-9 are practical and suitable for routine use.

## METHODOLOGY

This cross-sectional comparative study was conducted over a defined study period at Jinnah Postgraduate Medical Centre (JPMC) and the National Institute of Child Health (NICH) in Karachi, Pakistan, with two groups of women recruited to represent prepartum and postpartum populations. The prepartum group included pregnant women attending the Obstetrics and Gynaecology Ward at JPMC, whereas the postpartum group comprised women who had recently delivered and were visiting NICH for routine infant vaccination. Women aged 18 years or older, either currently pregnant or within one year postpartum, were eligible for inclusion; those with known psychiatric illness, chronic debilitating medical conditions, or unwillingness to participate were excluded to minimize confounding. A non-probability consecutive sampling

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technique was used to enrol all eligible participants, yielding a total sample size of 166 women (83 in each group), calculated using the World Health Organization sample size calculator based on an 18% expected prevalence of depressive symptoms, a 95% confidence level, and a 6% margin of error. Ethical approval was obtained from the Institutional Review Board of Jinnah Sindh Medical University, and all procedures adhered to internationally recognized ethical standards for human research. Data were collected using a structured, interviewer-administered questionnaire capturing sociodemographic, clinical, and obstetric information, and depression was assessed using the Patient Health Questionnaire-9 (PHQ-9), which evaluates symptom frequency over the preceding two weeks. Interviews were conducted privately by trained female data collectors to ensure standardization, confidentiality, and reduction of interviewer bias. PHQ-9 total scores were calculated and categorized according to established severity criteria to compare depressive symptoms between prepartum and postpartum women. Data were analysed using SPSS version 26, with descriptive statistics used to summarize participant characteristics, and Chi-square tests applied to compare depression severity between groups, considering $p \leq 0.05$ as statistically significant.

## RESULTS

**Table I** presents the baseline and clinical characteristics of 166 study participants, comparing prepartum (n=83) and postpartum (n=83) women. The mean age and parity were comparable between both groups, with prepartum women having a mean age of 29.24 ± 6.40 years and parity of 1.70 ± 1.35, while postpartum women had a mean age of 28.37 ± 6.45 years and parity of 1.88 ± 1.42, showing no statistically significant differences (p=0.386 and p=0.403, respectively). However, a statistically significant difference was observed in PHQ-9 depression scores, where prepartum women exhibited higher depressive symptoms (11.93 ± 6.08) than postpartum women (9.57 ± 7.51; p=0.027). Educational status also showed a highly significant association (p=0.0001), with a greater proportion of illiterate participants in the prepartum group (24.1%) compared to the postpartum group (4.8%), whereas secondary education was more common among postpartum women (55.4% vs. 25.3%). Socioeconomic status did not differ significantly (p=0.828), with an equal proportion of low socioeconomic status (42.2%) in both groups. Similarly, mode of delivery showed no significant difference (p=0.535), with comparable distributions of spontaneous vaginal delivery and caesarean section. The history of miscarriage was also not significantly different between prepartum (15.7%) and postpartum women (24.1%; p=0.173).

**Table II** compares the distribution of depressive symptoms between prepartum and postpartum mothers using the PHQ-9 scale. For the symptom "Little interest or pleasure in doing things," both groups exhibited similar response patterns, with no significant difference (p=0.329). However, a significant difference was observed in the symptom "Feeling down, depressed, or hopeless" (p=0.001), where 36.1% of prepartum mothers reported experiencing it nearly every day compared to only 13.3% in the postpartum group, while postpartum mothers more frequently reported experiencing symptoms on "more than half the days" (33.3% vs. 14.5%). Regarding "Trouble falling or staying asleep or sleeping too much," both groups showed comparable responses (p=0.956), with 42.2% in each group reporting symptoms nearly every day. A significant difference was noted in "Feeling tired or having little energy" (p=0.020), where prepartum mothers reported this symptom nearly every day more frequently (59%) compared to postpartum mothers (37.3%), while postpartum participants more commonly reported lesser frequency responses. For "Poor appetite or overeating," no significant difference was observed (p=0.124), though postpartum mothers reported "not at all" more frequently (33.7% vs. 20.5%). Feelings of self-worth issues ("Feeling bad about yourself…") did not show a significant association (p=0.771), with similar response patterns across groups. The symptom "Trouble concentrating" also did not show a significant difference (p=0.236), although a higher proportion of postpartum mothers reported no difficulty (61.4% vs. 45.8%). A highly significant difference was seen for "Moving or speaking slowly or being fidgety or restless" (p=0.001), with 59% of postpartum mothers reporting no symptoms compared to only 34.9% in the prepartum group, whereas prepartum mothers reported higher frequencies of nearly everyday symptoms (25.3% vs. 4.8%). Finally, "Thoughts of self-harm or suicidal ideation" showed a significant difference (p=0.017), with more postpartum mothers reporting these thoughts "more than half the days" (13.3% vs. 1.2%), while prepartum mothers more frequently reported "not at all" (81.9% vs. 72.3%).

**Table III** presents the comparison of depression severity between prepartum, and postpartum mothers based on PHQ-9 score categories. The findings indicate a statistically significant difference in overall depression severity between the two groups (p=0.021). A notably higher proportion of postpartum mothers had no depression (33.7%) compared to prepartum mothers (12%), suggesting better psychological well-being in the postpartum group. Conversely, prepartum mothers exhibited higher proportions across all depressive severity categories. Mild depression was reported by 21.7% of prepartum mothers versus 16.9% of postpartum mothers, while moderate depression was present in 32.5% and 27.7% of prepartum and postpartum mothers, respectively. Moderately severe depression was more prevalent in the prepartum group (22.9%) as compared to postpartum (14.5%). Severe depression, the most intense category, was also slightly more common among prepartum mothers (10.8%) than postpartum mothers (7.2%). These findings suggest that depressive symptoms were more pronounced and severe in prepartum mothers compared to postpartum mothers.

| Table I: Baseline and Clinical Characteristics of Study Participants (n=166) | | | | |
|---|---|---|---|---|
| **Characteristics** | | **Groups** | | **P-Value** |
| | | **Prepartum** (n=83) | **Postpartum** (n=83) | |
| Age in years, Mean ± SD | | 29.24 ± 6.40 | 28.37 ± 6.45 | 0.386 |
| Parity, Mean ± SD | | 1.70 ± 1.35 | 1.88 ± 1.42 | 0.403 |
| PHQ9 Level Score, Mean ± SD | | 11.93 ± 6.08 | 9.57 ± 7.51 | 0.027* |
| **Educational Status** | Illiterate | 20 (24.1) | 4 (4.8) | 0.0001* |
| | Primary | 20 (24.1) | 17 (20.5) | |
| | Secondary | 21 (25.3) | 46 (55.4) | |
| | Graduate | 22 (26.5) | 16 (19.3) | |
| **Socioeconomic Status** | Low | 35 (42.2) | 35 (42.2) | 0.828 |
| | Middle | 21 (25.3) | 24 (28.9) | |
| | High | 27 (32.5) | 24 (28.9) | |
| **Mode of Delivery** | SVD | 40 (48.2) | 44 (53.0) | 0.535 |
| | C-Section | 43 (51.8) | 39 (47.0) | |
| **History of Miscarriage** | | 13 (15.7) | 20 (24.1) | 0.173 |

| Table II: Comparison of Prepartum and Postpartum Depression in Mothers by Using PHQ-9 | | | | | | |
|---|---|---|---|---|---|---|
| **Depression Scale (PHQ-9)** | | **Not at all** | **Several days** | **More than half the day** | **Nearly every day** | **P-Value** |
| Little interest or pleasure in doing things | Pre-partum | 35 (42.2%) | 13 (15.7%) | 14 (16.9%) | 21 (25.3%) | 0.329 |
| | Post-partum | 42 (50.6%) | 16 (19.3%) | 13 (15.7%) | 12 (14.5%) | |
| Feeling down, depressed, or hopeless. | Pre-partum | 27 (32.5%) | 14 (16.9%) | 12 (14.5%) | 30 (36.1%) | 0.001* |
| | Post-partum | 31 (37.3%) | 13 (15.7%) | 28 (33.3%) | 11 (13.3%) | |
| Trouble falling or staying asleep or sleeping too much. | Pre-partum | 29 (34.9%) | 12 (14.5%) | 7 (8.4%) | 35 (42.2%) | 0.956 |
| | Post-partum | 27 (32.5%) | 12 (14.5%) | 9 (10.8%) | 35 (42.2%) | |
| Feeling tired or having little energy | Pre-partum | 8 (9.6%) | 8 (9.6%) | 18 (21.7%) | 49 (59%) | 0.020* |
| | Post-partum | 20 (24.1%) | 10 (12%) | 22 (26.5%) | 31 (37.3%) | |
| Poor appetite or overeating. | Pre-partum | 17 (20.5%) | 22 (26.5%) | 12 (14.5%) | 32 (38.6%) | 0.124 |
| | Post-partum | 28 (33.7%) | 17 (20.5%) | 16 (19.3%) | 22 (26.5%) | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Feeling bad about yourself, or that you are a failure, or have let yourself or your family down. | Pre-partum | 27 (32.5%) | 28 (33.7%) | 15 (18.1%) | 13 (15.7%) | 0.771 |
| | Post-partum | 33 (39.8%) | 23 (27.7%) | 14 (16.9%) | 13 (15.7%) | |
| Trouble concentrating on things, such as reading the newspaper or watching television. | Pre-partum | 38 (45.8%) | 20 (24.1%) | 14 (16.9%) | 11 (13.3%) | 0.236 |
| | Post-partum | 51 (61.4%) | 14 (16.9%) | 9 (10.8%) | 9 (10.8%) | |
| Moving or speaking so slowly that other people could have noticed. Or the opposite –being so fidgety or restless that you have been moving around a lot more than usual. | Pre-partum | 29 (34.9%) | 21 (25.3%) | 12 (14.5%) | 21 (25.3%) | 0.001* |
| | Post-partum | 49 (59.0%) | 21 (25.3%) | 9 (10.8%) | 4 (4.8%) | |
| Thoughts that you would be better off dead, or of hurting yourself in some way. | Pre-partum | 68 (81.9%) | 11 (13.3%) | 1 (1.2%) | 3 (3.6%) | 0.017* |
| | Post-partum | 60 (72.3%) | 7 (8.4%) | 11 (13.3%) | 5 (6.0%) | |

**Table III: Comparison of Severity of Depression in Prepartum and Postpartum Mothers (PHQ-9)**

| PHQ-9 | Pre-Partum | Post-Partum | P-Value |
|---|---|---|---|
| None (0~4) | 10 (12%) | 28 (33.7%) | 0.021* |
| Mild depression (5~9) | 18 (21.7%) | 14 (16.9%) | |
| Moderate depression (10~14) | 27 (32.5%) | 23 (27.7%) | |
| Moderately severe depression (15~19) | 19 (22.9%) | 12 (14.5%) | |
| Severe depression (20~27) | 9 (10.8%) | 6 (7.2%) | |

## DISCUSSION

The present study examined the severity of depression among prepartum and postpartum women using the PHQ 9 and found that prepartum women experienced significantly higher depressive symptoms than postpartum women, reflected by a higher mean PHQ 9 score of 11.93 compared with 9.57. These values indicate clinically meaningful differences because scores of 10 and above on the PHQ 9 generally suggest moderate depressive symptoms that require further evaluation. The higher levels of depression in the prepartum group are consistent with previous work showing that pregnancy often carries a substantial emotional and physiological burden, which increases vulnerability to psychological distress. Prior studies from South Asia demonstrated similarly elevated depressive symptoms in pregnant women facing socioeconomic hardship and limited social support[2]. International literature also supports these findings, as Woody and colleagues reported higher antenatal depression prevalence compared with postpartum prevalence across multiple populations[4]. Shorey and associates noted antenatal depression rates between 20 and 30 percent in Asian countries[5], comparable to the proportion of prepartum women in our study who fell into the moderate and severe depression categories. The higher frequency of several key depressive symptoms among prepartum women in our study, including depressed mood, low energy, and psychomotor changes, reflects the clinical pattern described in earlier validation studies of the PHQ 9[6]. These symptom specific differences also align with evidence from Velloza and colleagues, who observed higher PHQ 9 scores among pregnant women compared with postpartum women in a Kenyan cohort[9]. Findings from the past five to seven years continue to emphasize this trend. Gelaye and collaborators found that antenatal depression prevalence exceeded 25 percent in low- and middle-income populations where psychosocial adversity was common[11]. A Brazilian study reported a mean antenatal PHQ 9 score of 10.8, which closely matches our prepartum mean score of 11.93[12]. Research from China documented antenatal depression rates near 28 percent compared with 18 percent postpartum, a pattern consistent with the severity differences observed in our results[13]. A South Asian review reported that nearly one third of pregnant women screened positive for clinically significant depression, compared with approximately one fifth during the postpartum period[14]. A Canadian longitudinal study further demonstrated that antenatal depressive symptoms are strong predictors of postpartum depression, underscoring the importance of identifying elevated PHQ 9 scores during pregnancy[15]. A widely cited review found that antenatal depression prevalence

ranged from 22 to 34 percent in global samples, consistent with the severity distribution seen in our prepartum group[16]. In the United States, Silverman and colleagues reported mean antenatal PHQ 9 scores of approximately 12 in low-income urban populations, which is remarkably similar to our findings[17]. Notably, postpartum women in our study had higher percentages of no depression yet still exhibited concerning rates of suicidal thoughts. This observation is supported by recent epidemiological reports indicating that suicidal ideation, although less common overall, remains a significant concern in the postpartum period[18]. The strengths of this study include the use of a validated screening tool, standardised data collection procedures, and inclusion of participants from two major public sector hospitals that serve diverse communities. The comparative approach enhances the interpretability of differences between the two groups. However, several limitations should be acknowledged. The cross-sectional comparative design restricts the ability to determine causal relationships between pregnancy status and depressive symptoms. Consecutive sampling may limit generalisability to the broader population. The PHQ 9 is a screening instrument rather than a diagnostic measure, and structured clinical interviews could provide more definitive diagnoses. Additionally, psychosocial factors such as marital conflict, domestic stress, inadequate support, and unplanned pregnancy, which may influence depression, were not assessed. Despite these limitations, the study highlights the increased vulnerability of prepartum women to depressive symptoms and reinforces the need for early and routine screening during pregnancy. Integrating simple tools such as the PHQ 9 into antenatal care may improve early detection and timely referral, ultimately enhancing maternal and neonatal outcomes.

## CONCLUSION

The study found that prepartum women experienced significantly higher depressive symptoms than postpartum women, as reflected by higher PHQ-9 scores and greater proportions of moderate to severe depression. These findings highlight the need for routine screening and timely support for women during pregnancy, when depressive symptoms appear more pronounced. Integrating structured assessments like the PHQ-9 into antenatal care may improve early identification and intervention.

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Case Report

# Clinical Hypothyroidism in Steroid Sensitive Nephrotic Syndrome in a Young Boy

Aisha Haleem[1], Sanya Ashraf[2], Najaf Ahmed[3], Abdul Salam[4]

## ABSTRACT

**Background:** Nephrotic Syndrome is damage to kidney that leads to the hyperfiltration and excretion of protein in urine. Persistent proteinuria causes progressive oedema, Hypoalbuminemia and Hypercholesteremia. Many associated manifestations can be possible with the disease either due to genetic susceptibility or complications secondary to proteinuria including transient hypothyroidism due to loss of thyroxine binding globulin, transthyretin and albumin in urine.

**Case Presentation:** We report a case of 10 years old male patient previously well, presented with generalized body swelling for 1 month, constipation, lethargy and somnolence for 3 weeks. Clinically he had Anasarca, massive ascites and signs of pleural effusion. Labs revealed Hypoalbuminemia, Hypercholesterolemia and Protein+3 in dipstick with Urine PCR of 3.8. TSH= 21 significantly high. Secondary causes excluded and Paediatrics nephrology consult taken, advised to give steroid and Thyroxine for symptomatic Hypothyroidism.

**Conclusion:** As patient achieved complete remission after 4 weeks of daily methylprednisolone, Thyroxine also tapered with tapering dose of steroids and stopped at 12 weeks of treatment. Patients showed complete response with treatment and no relapses till 1 year of follow up.

**Keywords:** Clinical hypothyroidism, Steroid-sensitive nephrotic syndrome, Paediatric nephrology

## INTRODUCTION

Idiopathic nephrotic syndrome is the most prevalent glomerular disease in the paediatric population, impacting 1 to 17 out of every 100,000 children with a particularly high incidence among those of South Asian ancestry[1,2]. It is characterized by massive proteinuria (≥3+ protein corresponding to ≥300 mg/dL by dipstick examination), hypoalbuminemia (less than 2.5 gm/dL), generalized oedema and hyperlipidemia[3]. Although a kidney biopsy is not commonly performed for diagnosing this condition, in cases where it is done, it reveals injury patterns that align with minimal change disease or focal segmental glomerulosclerosis (FSGS) commonly[4]. These two conditions are classified as "podocytopathies" due to the damage they cause to podocytes, which makes up an important component of the glomerular filtration barrier. Idiopathic nephrotic syndrome is associated with a wide array of complications, largely stemming from the leakage of important proteins from the body, of which hormonal alterations make up a significant proportion[5]. Numerous studies report the presence of hypothyroidism in children[6-8]; however, more often, this hypothyroidism is subclinical, with no evidence of classic symptoms such as fatigue, weight gain, and constipation. There is limited data reporting evidence of overt hypothyroidism secondary to nephrotic syndrome in children.

This case report presents a case of a 10-year-old male with a one-month history of nephrotic syndrome together with clinical symptoms of hypothyroidism.

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## CASE PRESENTATION

We report a case of 10 years old male patient, presented with generalized body swelling followed by constipation and somnolence. The patient and his direct family had no notable history of arthralgia, photosensitivity, oral ulcers, tuberculosis or hepatitis. Clinical examination revealed normotension, ascites and decreased air entry in lungs, characterized by stony dullness to percussion at basal lung fields. Ultrasound KUB and thyroid were normal. Summarized laboratory findings of the patients are indicated in **Table I.**

The weight of the patient had notable increase from 30kg to 34kg. The patient had respiratory symptoms due to pleural effusion for which 1g/kg Albumin injection along with furosemide for diuresis were administered, which otherwise is not routinely recommended. This was followed by consultation from paediatrics nephrologists which advised screening for anti-nuclear antibody (ANA) and C3 levels that came out negative. Transient hypothyroidism was attributed to loss of thyroid binding globulin (TBG) in urine; rarely are such high levels associated with clinical symptoms.

Renal biopsy was deferred due to patient's age. Trial steroids are given to all patients with nephrotic syndrome due to which upon discharge, the patient was placed on methylprednisolone at 60 mg orally once daily and thyroxin at 50 $\mu$g orally once daily.

At week 4 of treatment, the patient had complete remission due to which methyl prednisolone was tapered to 40mg every alternative day (1.5mg/kg) and on reduced weight to 27kg, Thyroxine was adjusted to 25 $\mu$g daily.

During the follow-up at 12th week, patient maintained complete remission. TSH and FT4 levels were reduced to 8 m IU/L and 0.67 ng/dl and at 1 year after treatment, hormonal levels recorded as 4.8 m IU/L and 1.2 ng/dL respectively.

| Table I: Diagnostic Reports at Presentation | | | | |
|---|---|---|---|---|
| **Laboratory Tests** | **Results** | **At 12 weeks follow up** | **1 year follow up** | **Reference Range** |
| Serum Cholesterol | 760mg/dL | --- | --- | <200mg/dl |
| Serum Albumin | 1.3g/dL | 3.1 | --- | >3.5 g/dl |
| Urine Dipstick | (+4) | Negative | Negative | Negative |
| Urine Protein-Creatinine Ratio | 3.8 | 0.1 | --- | <0.2 |
| TSH | 21 | 08 | 4.8 | 0.5 to 5 mIU/L |
| FT4 | 0.2 | 0.67 | 1.2 | 0.8 to 1.8 ng/dL |

## DISCUSSION

Thyroid hormones are crucial for normal development and growth of many target tissues in adolescents, including the brain and the skeleton. They exist in the circulation mainly bound to thyroglobulin binding protein, transthyretin and albumin. In individuals with normal thyroid function, only 0.03% of T4 and 0.3% of T3 is unbound or 'free' and immediately available to enter cells for downstream effects[9]. Owing to the proteinuria, which is a hallmark feature of idiopathic nephrotic syndrome, there is subsequent loss of these carrier proteins that contributes to the hypothyroidism observed. This not only has profound implications for the metabolic system but also significantly impairs cognitive function, as demonstrated in our case, where the child exhibited somnolence, lethargy, and persistent fatigue. The typical pattern of thyroid function alteration reveals a high TSH and low total T4, as seen in our patient. Idiopathic nephrotic syndrome can follow two courses; it may be steroid sensitive (SSNS) or steroid resistant (SRNS), both of which are associated with hypothyroidism as a potential complication with SRNS being more strongly associated with the development of clinical hypothyroidism[10].Our patient showed improvement with steroids and did not report any relapse up to 1 year of follow up, aligning with SSNS. It is important to note that future relapses may occur, and there is a risk of progression to steroid-resistant nephrotic syndrome (SRNS), which is associated with worse outcomes[11].The degree of proteinuria and serum albumin levels correlate positively with the severity of thyroid dysfunction thus explaining the worsening of thyroid function in some while others remain euthyroid[12]. Presence of preexisting kidney disease or autoimmune thyroid disorder may also be contributing factors for overt symptoms; however, these were ruled out in our case. A key limitation in our case report is a lack of known histological variant of nephrotic syndrome as thyroid function abnormalities may vary greatly across different subtypes. In resource limited countries like Pakistan, patients presenting in tertiary care hospitals have more fulminant symptoms[13]. In general, and thus the degree of proteinuria may be high as is evident from the lab findings in our patient. It is therefore essential to promptly recognize these symptoms through thorough history taking and thyroid function tests must be reviewed in any patient presenting with high grade proteinuria.

## CONCLUSION

Subclinical hypothyroidism is a recognized complication of nephrotic syndrome, while overt clinical presentation is uncommon. In the present case, remission was achieved with steroid therapy, allowing successful tapering and discontinuation of thyroxine, with sustained clinical recovery and no relapse at one year of follow-up.

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# Athletes in White Coats: The Double-Edged Sword of Competitive Mindsets

Haleema Sadia[1], Abdul Muhaiman[2]

**Dear Editor,**

The cognitive, emotional, and psychological demands of medical training extend well beyond the formal curriculum and often require competencies developed outside conventional academic environments. Competitive athletics represents one such domain, offering psychological conditioning that may appear distant from medical education. However, both athletics and medicine share notable similarities in the pressures they place on decision making, performance under stress, and emotional regulation. Whether these shared attributes facilitate or hinder the professional development of medical students warrants thoughtful consideration.

Both athletes and medical trainees frequently operate in high pressure environments characterized by outcome-oriented thinking. In competitive sports, performance is often framed in terms of success or failure, while in medicine clinical decisions may be perceived as having life altering consequences. This dichotomous framing may be reinforced during undergraduate medical education, where an emphasis on error avoidance and high stakes responsibility can foster fear-based learning. Although intended to promote vigilance, such an approach may inadvertently undermine confidence, adaptability, and reflective practice, which are core competencies essential for effective clinical care.

Elite athletes are systematically trained in psychological strategies such as stress regulation, mental rehearsal, and resilience building to sustain performance under pressure. Incorporating similar evidence based psychological skills training into medical education may help students manage academic stress and clinical responsibilities more effectively. Studies among Pakistani medical students have demonstrated high prevalence of stress, psychological distress, and varied coping strategies. For example, a recent multi-center descriptive study reported common causes of academic stress such as disturbed study-life balance, demanding curriculum, and worrying about the future, with coping mechanisms including engagement in leisure and faith-based activities[1]. A cross-sectional study of medical students in Lahore reported substantial psychological morbidity and distress related to academic concerns, highlighting the need for enhanced support systems[2]. Another study found a high prevalence of stress (59%) among medical students, with both active and passive coping strategies employed to manage perceived stress[3]. Further, elevated stress, anxiety, and depressive symptoms were associated with maladaptive coping behaviors among Pakistani medical students, underscoring the complexity of the stress-coping relationship in this population[4]. Collectively, these findings underscore the need for structured interventions aimed at promoting psychological resilience within medical training programs.

A key distinction between athletics and medical education lies in the approach to teamwork. In sports, collective performance is emphasized and success or failure is shared among team members. Athletes are trained to rely on coordinated decision making, mutual support, and shared accountability. In contrast, medical education often prioritizes individual achievement through competitive assessment systems, merit rankings, and academic distinctions. This individualistic culture may limit opportunities for collaborative learning and peer support, potentially contributing to isolation and emotional fatigue among medical students.

Adopting a more team based and collaborative framework within medical education, similar to that employed in competitive sports, may enhance clinical decision making, reduce stress, and foster a stronger sense of professional community. Such an approach could support not only academic performance but also the mental wellbeing of future physicians, ultimately benefiting patient care.

We believe that integrating structured resilience training and collaborative learning models into undergraduate medical curricula deserves greater attention and discussion within the medical education community.

**Authors' Contributions:** All authors took part in this study to an equal extent. **Sadia H:** Study design, literature search, and manuscript writing. **Muhaiman A:** Study conception, idea development, and manuscript writing.

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Letter to the Editor

# Escalating Antimicrobial Resistance: A Silent Public Health Catastrophe

Naqash Mukhtiar[1], Nazia Arain[2]

**To the Editor,**

Antimicrobial resistance (AMR) has emerged as one of the most serious public health threats in Pakistan, undermining the effective management of infectious diseases and compromising patient safety. Surveillance data from tertiary care hospitals reveal a sustained rise in resistance among major bacterial pathogens, including *Escherichia coli*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, and *Pseudomonas aeruginosa*, commonly isolated from urinary tract and bloodstream infections. These organisms are responsible for a significant proportion of community- and hospital-acquired infections, making the observed resistance patterns particularly alarming.

The gravity of the AMR crisis in Pakistan became globally evident with the emergence of extensively drug-resistant *Salmonella Typhi* (XDR typhoid). First reported in 2016 and subsequently described in the international literature, XDR typhoid demonstrated resistance to multiple first-line and second-line antimicrobials, leaving only limited therapeutic options[1]. This landmark development highlighted the consequences of prolonged antimicrobial misuse and raised concerns regarding international dissemination through travel and migration.

Beyond typhoid, resistance among gram-negative organisms has continued to escalate. Over recent years, declining susceptibility to third-generation cephalosporins and fluoroquinolones has been followed by increasing resistance to carbapenems, including meropenem. Of particular concern is the emergence of colistin resistance among carbapenem-resistant Enterobacterales in Pakistan, further narrowing the already limited treatment options for severe infections[2]. Such trends signal a potential future in which clinicians may encounter bacterial infections that are exceedingly difficult, or even impossible, to treat.

A major contributor to this accelerating resistance is the irrational and excessive use of antibiotics. Broad-spectrum agents are frequently prescribed for viral upper respiratory and gastrointestinal infections, despite their lack of clinical efficacy. In addition, non-prescription access to antibiotics remains widespread, encouraging self-medication, inappropriate dosing, and premature discontinuation of therapy. These practices are compounded by limited antimicrobial stewardship programs and insufficient reliance on culture- and sensitivity-guided treatment.

National and global surveillance data further confirm that Pakistan continues to face a growing AMR burden. Reports from the World Health Organization's Global Antimicrobial Resistance and Use Surveillance System (GLASS) highlight rising resistance rates across multiple priority pathogens and emphasize the urgent need for coordinated national action[3]. Without effective surveillance, stewardship, and regulatory enforcement, resistance will continue to spread across healthcare and community settings.

Addressing this escalating crisis requires immediate and coordinated interventions. Strengthening antimicrobial stewardship programs, enforcing prescription-only antibiotic policies, expanding laboratory-based surveillance, and integrating resistance data into public health policy are essential. Equally important is increasing awareness among healthcare professionals and the public regarding rational antimicrobial use. Urgent, collective action by clinicians, microbiologists, public health experts, and policymakers is crucial to prevent a return to an era in which common infections once again become life-threatening.

**Authors' Contributions:** All authors took part in this study to an equal extent. **Mukhtiar N:** Study design, literature search, and manuscript writing. **Arain N:** Critical review and supervision.

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