ORIGINAL RESEARCH PAPER

General Surgery

A COMPARATIVE CROSS-SECTIONAL STUDY ON WAGNER'S CLASSIFICATION AND THE NEWLY INTRODUCED WOUND-BASED SEVERITY SCORING SYSTEM FOR DIABETIC FOOT ULCERS.

KEY WORDS: Diabetic ulcer severity score, Diabetes, Wagner's classification, Diabetic Ulcer Severity Score.

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ABSTRACT

Introduction: Diabetes is recognized as one of the most prevalent health issues globally in the 21st century[1]. It has even earned the moniker of the "Black Death of the 21st Century," a term that reflects the parallels between the rapid spread of diabetes and the 14th-century plague in terms of escalating prevalence, morbidity, and mortality[2]. **Methodology:** From June 2023 to June 2024, diabetic patients with foot ulcers were recruited for a study at Al-Ameen Medical College, Vijayapura. The study included 40 diabetic patients, regardless of the duration of their condition, who were either attending the surgical outpatient clinic or were admitted to Al-Ameen Medical College and Hospital. **Results:** The evaluation of treatment using the DUSS and Wagner scoring systems showed nearly identical results, with a statistically significant p-value (p=0.001). Furthermore, KAPPA statistics indicated perfect agreement (score of 1) between the two scoring systems, demonstrating their consistency in assessing diabetic foot ulcers. **Conclusion:** In our institution's experience, the overall survival rate for neonates with CDH was favorable. Mortality risk factors included the onset of respiratory distress, a maximum oxygenation index (OI) greater than 15 on the first day, and the necessity for preoperative ventilation. Conversely, a maximum OI below 15 on the first day and the absence of severe pulmonary hypertension were strong predictors of survival in CDH neonates

INTRODUCTION:

Diabetes is one of the most significant global health challenges of the 21st century, often referred to as the "black death of the 21st century" due to its alarming rise in prevalence, morbidity, and mortality, drawing parallels to the 14th-century plague. According to the World Health Organization (WHO), there were approximately 171 million diabetic patients in the year 2000, with projections estimating this number would increase to 380 million by 2020. In India alone, the diabetic population is predicted to reach 57 million by 2025[3].

One of the most severe complications associated with diabetes is diabetic foot ulcers, affecting nearly 15% of diabetic patients [4]. The annual incidence of diabetic foot ulcers is about 3%, with studies from the U.S. and U.K. reporting rates as high as 10%. These ulcers are a significant global public health issue, leading to considerable morbidity and mortality among diabetic patients. Over half of these ulcers become infected[5], resulting in increased hospitalizations, complications, and a high likelihood of lower limb amputations[6]. It is reported that 85% of lower limb amputations in diabetic patients are preceded by foot ulcers, and those who undergo one amputation have a 50% chance of developing a severe ulcer in the other limb within two years. Additionally, the five-year mortality rate following the first amputation stands at 50%.

The Diabetic Ulcer Severity Score (DUSS) is one of the more recent wound-based classification systems. However, there is a lack of sufficient data to determine whether DUSS offers advantages over well-established systems such as Wagner's classification. Therefore, this study aims to validate the DUSS scoring system by comparing it with Wagner's classification, with a focus on assessing disease outcome.

Objectives:

The aim and objectives of the study were to conduct a comparison between Wagner's classification and the new wound-based Diabetic Ulcer Severity Score (DUSS). The study sought to calculate both Wagner's and DUSS scores and validate their effectiveness by correlating the scores with patient outcomes, including healing rates and the incidence of amputations.

Methodology:

The current study was undertaken in the Department of General Surgery at Al-Ameen Medical College, Vijayapura. Ethical approval from the appropriate committee was obtained for all procedures involving human subjects.

A total of 40 diabetic patients with foot ulcers, regardless of their ulcer duration, were recruited for this study at Al-Ameen Medical College, Vijayapura. These patients were selected based on specific inclusion and exclusion criteria.

Ulcers were classified as infected if purulent discharge was present along with at least two local signs, such as warmth, erythema, lymphangitis, lymphadenopathy, edema, or pain. Wound depth was assessed using a sterile blunt probe, and the ability to probe to the bone, in conjunction with local inflammation or systemic infection signs, along with radiological indicators, was used to diagnose osteomyelitis.

Peripheral vascular disease was diagnosed clinically by the absence of both pedal pulses. Patients were grouped based on whether they had single or multiple ulcerations on the same foot. For those with multiple ulcers, the wound with the highest severity grading was selected for analysis. If multiple ulcers had the same grading, the larger wound was chosen for evaluation.

Patients with unhealed ulcers were followed for a minimum of six months. Once an ulcer had completely healed, either through primary healing, skin grafting, or in cases of lower-limb amputation, the outcome was recorded, and the patient was considered to have completed the study.

Location of Study:

The study took place at the Department of General Surgery, Al-Ameen Medical College,Vijayapura.

Study Duration:

The research was conducted over a period from June 2023 to

June 2024.

Sample Size:
A total of 40 participants were included in the study.

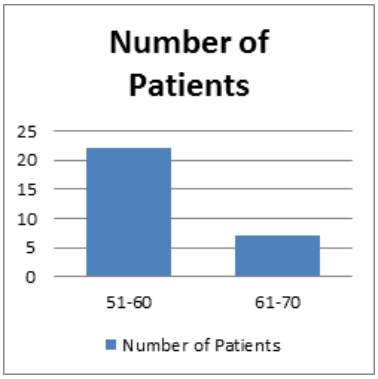
Study Design:
This was a comparative cross-sectional study.

Inclusion Criteria:
Participants included diabetic patients with lower limb ulcers, aged between 20 and 80 years, regardless of gender or the duration of their ulcers. Only those willing to participate in the study were considered.

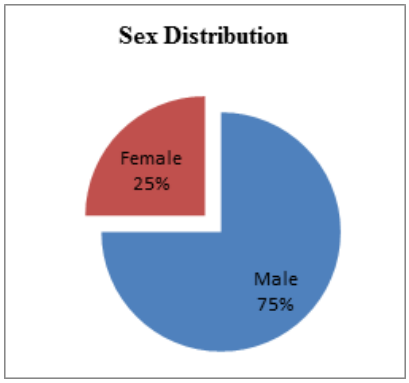
Exclusion Criteria:
Patients with venous stasis ulcers along with diabetes, those with fewer than two follow-up visits, individuals with non-diabetic neuropathic ulcers, non-diabetic patients with foot ulcers, and those unwilling to participate were excluded from the study.

Statistical analysis:
Descriptive statistics were utilized in the comparative study of the Diabetic Ulcer Severity Score (DUSS) and Wagner's classification, with cases analyzed and expressed in percentages.

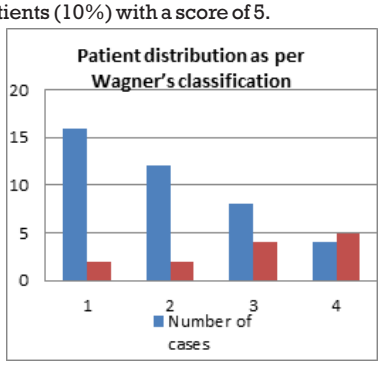
RESULTS:
Age Distribution:
The most prevalent age group affected by diabetic foot ulcers was between 51 and 60 years, accounting for 50% of the cases. This was followed by the 61 to 70 years age group, which comprised 35% of the participants. The mean age was 60.95 ± 8.60 years, with a median age of 60.0 years (interquartile range: 55.25 to 68 years).



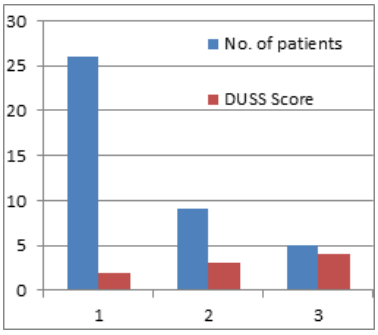
Sex Distribution
In this study, males were more commonly affected by diabetic foot ulcers, representing 75% of the cases, compared to 25% in females, resulting in a male-to-female ratio of 3:1



Patient Distribution According to Wagner's Classification
The majority of patients were categorized with a Wagner score of 2, totaling 16 cases (40%). This was followed by 12 cases (30%) with a score of 3, 8 patients (20%) with a score of 4, and 4 patients (10%) with a score of 5.



Patient Distribution According to DUSS Score



The DUSS score distribution revealed that the highest number of cases, 26 (65%), had a DUSS score of 2. This was followed by 9 patients (22.5%) with a score of 3 and 5 cases (12.5%) with a score of 4.

Treatment DUSS score:
Here DUSS score was compared with different treatment strategies which had shown chi square value of 65.641 and p=0.001 which was found to be significant. The findings are depicted in following

Treatment		DUSS score BL			Total
		2	3	4	
BKA	Count	0	0	5	5
	%	0	0	100	100
D SSG	Count	4	1	0	5
	%	80	20	0	100
DD	Count	20	0	0	20
	%	100	0	0	100
RA	Count	2	8	0	10
	%	20	80	0	100
Total	Count	26	9	5	40
	%	65	22.5	12.5	100

Treatment Wagner's score:
Here Wagner's score was compared with different treatment strategies which had shown chi square value of 58.708 and p=0.001 which was found to be significant. The findings are depicted in following.

Treatment		Wagner score BL				Total
		2	3	4	5	
BKA	Count	0	0	1	4	5
	%	0	0	20	80	100
D SSG	Count	1	4	0	0	5
	%	20	80	0	0	100
DD	Count	11	9	0	0	20
	%	55	45	0	0	100
RA	Count	0	3	7	0	10
	%	0	30	70	0	100
Total	Count	12	16	8	4	40
	%	30	40	20	10	100

DUSS score vs. Wagner's score:
Here using kappa stats when DUSS score was compared with Wagner's score , kappa value was found to be 0.633 and p value of 0.001 which was found to be significant.

Images of Below Knee Amputation (BKA):

DISCUSSION:

One of the most severe complications of diabetes is diabetic foot ulcers. Recent research indicates that diabetic patients face up to a 25% lifetime risk of developing a foot ulcer. The treatment of foot ulcers is often prolonged and intensive, significantly impacting the quality of life for both patients and caregivers and leading to substantial healthcare costs. The associated morbidity and mortality rates for diabetic foot ulcers remain alarmingly high, highlighting the need for optimized management strategies to achieve the best possible outcomes.

In this study, 40 diabetic patients with foot ulcers, regardless of the ulcer duration, were recruited from the surgical outpatient clinic or admitted to Al-Ameen Medical College and Hospital, Vijayapura, based on previously outlined inclusion and exclusion criteria. Each patient was assessed using both the Wagner's and Diabetic Ulcer Severity Score (DUSS) classification systems. The outcomes from both classification systems were compared and further analyzed in the context of existing literature.

CONCLUSION:

The Diabetic Ulcer Severity Score (DUSS) is comparable to the widely accepted Wagner's system for predictive analysis, offering insights into the likelihood of hospital admissions, local surgical procedures, and healthcare expenses. Given its ease of application in routine clinical practice, DUSS may serve as a useful tool for estimating potential healthcare costs.

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