How to Cite:
Nawaz, A., Solati, R. R., Bhat, A. N., & Nayak, A. (2022). Determine the correlation between malaria severity assessment score and duration of hospital stay in malaria patients at tertiary care centre. *International Journal of Health Sciences*, *6*(S6), 6508–6516. https://doi.org/10.53730/ijhs.v6nS6.11116

Determine the correlation between malaria severity assessment score and duration of hospital stay in malaria patients at tertiary care centre

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Abstract---INTRODUCTION: Malaria is the most important tropical disease accounts for mortality with estimates of over million deaths around the world making an impact to society. Malaria can lead to various organ system dysfunction and cause mortality and morbidity of the patient. Purpose of this study is to determine correlation between malaria severity assessment score and duration of hospital stay among the patients of malaria at tertiary care centre. METHODS: A cross-sectional study involving patients diagnosed with malaria as per WHO guidelines across a study period of 18 months was conducted from 2019- 2021. organ dysfunction was taken into consideration and used for assessment of malaria severity score. RESULTS: Among 82 positive cases of malaria, various parameters were taken into consideration for the assessment of score. among them neurological and hepatic parameters are least significant and contributes for less than 1 percent of cases and also severity. Renal parameters contribute for about 50 percent of mild cases and 2 percent of moderate cases among both males and females. Respiratory

parameters show 40 percent of mild cases and 1.2 percent of moderate cases. cardiac parameters contribute for about 40 percent of mild cases and 2 percent of moderate to severe cases. Blood and metabolic parameters also contribute for the score and assessment for duration of hospital stay. CONCLUSIONS: The malaria severity assessment score is based on various organ dysfunctions and various systems involved and is assessed by score which can be used for the estimation of duration of hospital stay.my study proved that there is a positive correlation between malaria severity assessment score and duration of hospital stay.

Keywords---Malaria severity assessment score, multi organ dysfunction, duration of hospital stay.

Introduction

Malaria is the most important tropical disease accounts for mortality with WHO estimates of over million deaths around the world making an impact to society. [1]. This is attributed to various reasons such as differences in the healthcare system, socio-cultural background and ethnicity. Complications can develop during the treatment of malaria which has higher mortality and morbidity. The areas where high maternal mortality rates have been reported are the ones from where studies are lacking. It is important to fill these lacunae. Malaria patients require quality care immediately, as the leading cause of mortality and morbidity is India. Research was done for estimating prognosis and risk in malaria including complications during the course of illness [2]. Malaria is a worldwide health problem causing for many deaths and aim is to prevent and control malaria and plans are made in reducing the burden of disease all over the world. An estimation of more than 50% malarial deaths happened in 20% of the population.[3]

The poor distribution among malaria is higher than that for any other disease of public health importance. Lack of awareness and money are important aspects of poverty. P.falciparum and P.vivax malaria can cause hospital mortality and is a challenge to handle in most developing countries. A sick malaria patient is one who, develops complications needs intensive monitoring, therapy or life support system. Care of the sick patients presents a unique challenge as the monitoring and the treatment must take into account in malaria positive patients.[4] Complications are helpful for all types of malaria to explain the course of the disease. Most of patients has complications leading to organ dysfunction. Malaria severity assessment score is required for risk estimation and progression of disease.[5]. The present study was done to estimate correlation of organ Dysfunction and duration of hospital stay includes for mortality and morbidity of the malaria patients based on organ dysfunction with help of malaria scores. [6] This study was conducted to improve the quality of health care in our institution affiliated hospitals by analyzing the malaria patients admitted in hospital and to understand the elements influencing the outcome and thereby to focus on correctable measures to be considered.[7].

Materials and Methods

Study Setting

Confirmed cases of malaria reported to KMC, Mangalore during the duration of two years from July 2019 to September 2021.

Case Selection

All adult, malaria patients attending the outpatient department of the affiliated hospitals who were diagnosed to have malaria were invited to participate in the study. The patients were considered for possible enrolment into the study by screening their clinical history. All cases with coexisting conditions contributing to an altered host response to infection such as HIV, chronic kidney disease and malignancies were excluded. All cases of organ dysfunctions assessed by routine investigations and malaria severity assessment (MSA) score has been calculated. The MSA score is defined as 1 × (severe anemia [hemoglobin level, <5 g/dL]) + 2 × (acute renal failure [creatinine level, > 3mg/dL]) + 3 × (respiratory distress, requiring mechanical ventilation) + 4 × (cerebral malaria [GCS <11]), in which each variable was scored as 0 or 1, depending on its absence or presence, respectively.

Data Collection

- Data was collected in a proforma. Patients diagnosed with malaria after applying exclusion criteria was included. Follow up notes and relevant investigations during hospital stay was recorded.
- Enrolment of malaria cases as mentioned above.
- Defining organ dysfunction
- Defining levels of organ dysfunction severity
- MSA score for calculation of outcome of the patient.
- Criteria for multi organ dysfunction in malaria patients are added with components i.e., blood arterial pH and HCO3

Each parameter will be further sub divided and score will be allotted according the table below and analyzed for severity assessment and outcome i.e full recovery or death will assed according to the severity

LEVELS

	0	1	2	3
CNS: GCS :	14-15	10-13	7-9	0-6
RENAL BU:	10-36	37-59	60-119	>120
Creatinine:	0.6-1.2	1.3-1.9	2.0-4.9	>5
CVS: HR:	51-119	120-139	>140,<51	
SBP:	90-160	70-89	41-69	
RESPI: RR:	20-30	31-40	>41	
BLOOD: HB:	10-13.9	7-9.9	<7	
TLC:	4-16K	2-4K	< 2K,10-20K	

PLATELETS	80-2.5L	<80K
HEPATIC: S.BIL:	<2	>2
METABOLIC:BG:	60-110	<60
ART PH	>7.4	<7.3
S.HCO3	>15	<15

SEVERITY SCORE OF EACH ORGAN DYSFUNCTION WITH DIFFERENT LEVEL OF SEVERITY

Organ Dysfunction	Level 0	I	II	III
Neurologic	Score-0	Score-1	Score-3	Score-5
Renal	Score 0	Score -1	Score -3	Score -5
Cardiovascular	Score -0	Score -1	Score -3	
Respiratory	Score -0	Score -1	Score -3	
Hematologic	Score -0	Score -1	Score -3	
Hepatic	Score -0	Score-1		
Metabolic	Score-0	Score-1		

Statistical Analysis

- Data will be analyzed using SPSS, version 11.5 (SPSS Inc., Chicago, IL USA)
- Normally collected data will be kept as mean and standard deviation; other data as median and interquartile range.
- Normality of data distribution will be assessed using the Shapiro-Wilk test. Correlation will be done using the Spearman's rank-order correlation.
- A p-value <0.05 was considered statistically significant.

Results

Table 1

Descriptive statistics on the age (in years) of the study participants

	N	Minimum	Maximum	Mean	Std. Deviation
AGE	82	24	72	43.37	11.753

In the present study a total of 82 individuals were considered. The mean age of the study participants is 43.37 ± 11.7 years.

A total of 82 people with malaria, who satisfied the inclusion criteria were subjected to this study. The minimum age for these criteria is 24 years and maximum age 72, with mean age of 43.37years associated with complications of malaria.

Table 2

Age and gender wise distribution of the study participants

Age (in years)		GENDER		Total
		Males	Females	
20-29	Count	3	9	12
	% of Total	3.7%	11.0%	14.6%
30-39	Count	14	9	23
	% of Total	17.1%	11.0%	28.0%
40-49	Count	15	8	23
	% of Total	18.3%	9.8%	28.0%
50-59	Count	9	6	15
	% of Total	11.0%	7.3%	18.3%
60-69	Count	5	3	8
	% of Total	6.1%	3.7%	9.8%
>=70	Count	0	1	1
	% of Total	.0%	1.2%	1.2%
Total	Count	46	36	82
	% of Total	56.1%	43.9%	100.0%

Majority of the study participants 46(56%) are in the age group of 30 to 49 years

In this study, age and gender-wise distribution of the study participants were taken. Among them, age group of 20-29yrs accounted for 14.6%, 30-39yrs accounted for 28% 40-49yrs accounted for 28%, 50-59yrs accounted for 18.3%, 60-69yrs accounted for 9.8% more than 72yrs accounted for 1.2%. Among them 56% are males and 44% are females. The average study participants are in the age group 30-49yrs.

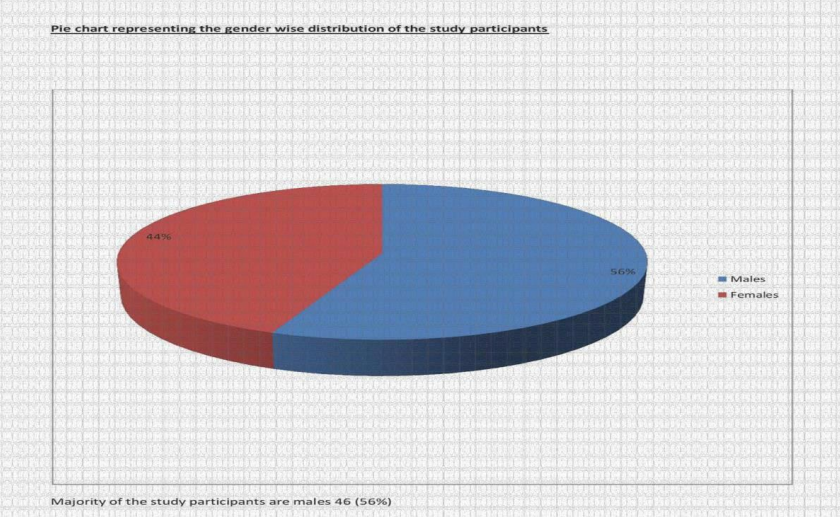

Figure 1

In this study, pie chart representing the gender-wise distribution of the study participants, among them, 46 (56%) are males, compared to 36 (44%) are females.

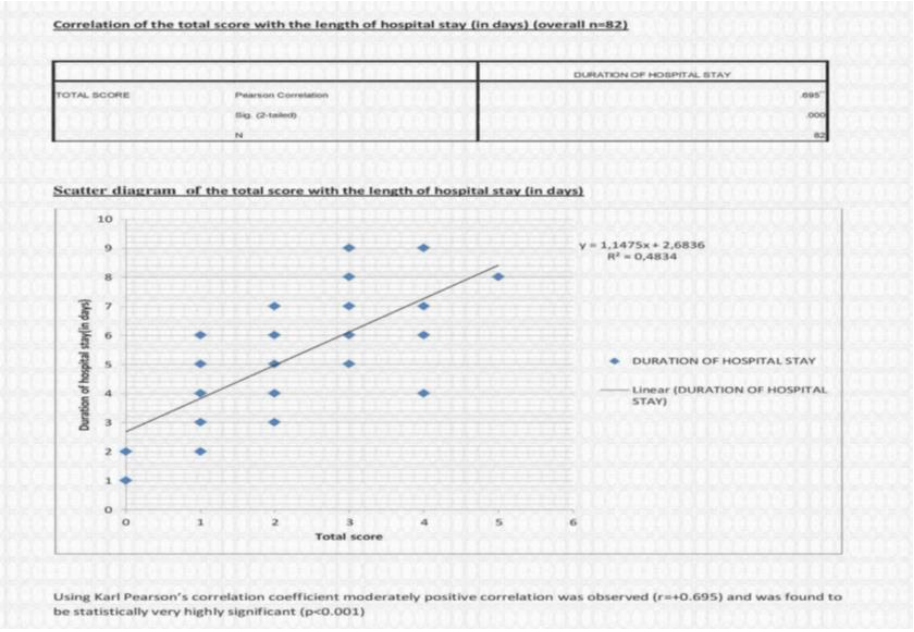

Figure 2

In this study, correlation of the total score, with the length of hospital stay (in days) with overall sample size of 82, Pearson's correlation is 0.695. The scattered diagram was represented for the total score, with the length of the hospital stay in days, where y=1.1475x+2.6836 R2=0.4834. Results showed linear distribution for duration of hospital stay, moderately positive correlation was observed, with (r=+0.695) and was found to be statistically very highly significant (p<0.001).

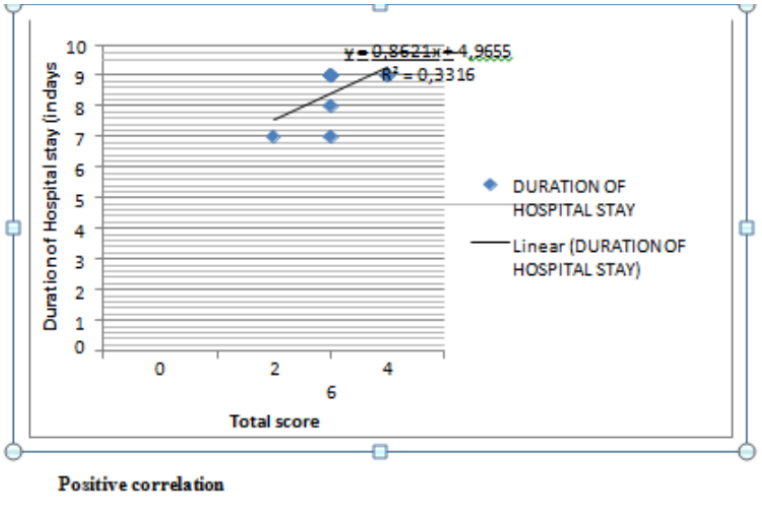

Figure 3

In this study, icu admission patients were taken, and compared among the study participants, out of which, 10 cases were admitted in icu and randomized. After Pearson Correlation (0.576).

Discussion

In this study the mean age of admission of the patient is 43.37+/- years which is compared with other studies like Mohopatra MP and Das SK was 37.36+/-10.7. In this study gender has been compared with other studies.in my study total number of males involved is 56% when compared to Mohopatra MP and Das SK study was 65.4% and female population involved in my study includes 44% while other studies included 34.6% of the population. In my study majority of the population is around mean age of 43 years with majority of the population are males and when compared to Mohopatra MP and Das SK which has mean age of 37 years and majority of the population are males with 65% when compared to females of 34% in the study. DA severity score of 0, 1, 3, and 5 was assigned to 0, I, II, and III level of severity respectively.

The score may be as low as 1 or as high as 5 for neurologic and renal involvement. For cardiovascular, respiratory, and hematologic system the lowest and the highest score was 1 and 3. For hepatic and metabolic involvement only 1 score was assigned. Malaria severity assessment score of 0 indicates no organ dysfunction, whereas MSA of 1 is the lowest level of severity possible for one single organ dysfunction. The maximum score with 21 points can be found when a patient has all 7 organs dysfunction with their highest level of severity. the score for dysfunction of various organs in different combinations and with variable grades of severity It can also be helpful for the present Malaria Severity Assesment Score (MSA) is a physiological scoring system useful for the assessment of the disease severity. It is to assess mortality risk among patients with severe malaria. The present study predicted the risk estimation of mortality and morbidity based of organ dysfunction.

Conclusions

My study will record the Malaria Severity Assessment score and the duration of hospital or ICU stay for all patients. At the end of the study, statistical analysis will determine whether there is a correlation between two or not. To begin with, we assume that there is a moderate positive correlation i.e., as the Malaria Severity Assessment score increases, the hospital stays increase. My study data answered this is true.

List of declarations
Authors' contributions

Ajay Nagesh Bhat and Rahul Reddy Solati made substantial contributions to study conception and design and to the drafting and critical revision of the manuscript for important intellectual content. Arjun Nayak and Alam Nawaz participated in the design and interpretation of the studies, and the review of the manuscript. All authors read and approved the final manuscript.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Acknowledgments

I express my sincere gratitude to Dr. Damodara Shenoy, Professor and Head of the department, for his valuable advice and support.

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