JPUMHS

Open Access Original Research Article

ETIOLOGICAL RISK FACTORS FOR NEONATAL JAUNDICE.

Irfan Sarwar[1], Attiya Ayaz[2], Kishwar Ammir[3], Nusrat Bashir[4], Taj Muhammad[5,] Azizullah Langah[6]

ABSTRACT

INTRODUCTION: globally around 1.1 million babies born develop the condition of hyperbilirubinemia, with a small number of cases also developing complications that can proceed into fatal outcomes **OBJECTIVE:** The current study was aimed at investigating the etiological risk factors for neonatal jaundice. **DESIGN:** Quantitative research design **DURATION:** Nov 2019 to Feb 2021 in Pediatrics Unit, Ayub Teaching Hospital, Abbottabad **METHOD:** The study utilized correlation analysis through SPSS to obtain statistical association of the chosen variables with outcomes. **RESULT:** The research found that among the variables selected, umbilical vein catheterization and respiratory distress are significant risk factors for neonatal jaundice occurrence. **CONCLUSION:** Findings on this to subject have led to the conclusion that neonatal jaundice complications that affect the brain of the baby are most likely to cause higher death rates, as meningitis and sepsis may enable morbid outcomes. However, further research is required into the subjects, in order to differentiate between manageable complications hypoxic ischemic encephalopathy and conditions in which fatality becomes imminent.

KEYWORDS: Neonatal Jaundice, Etiological Risk Factors and Incidence Rate.

1. Anesthetist, THQH Kahuta, Rawalpindi, Pakistan.
2. Professor, Department of Obstetrics & Gynecology, Women and Children Hospital, Abbottabad, Pakistan.
3. Post graduate trainee, Department of Obstetrics & Gynecology, Women and Children Hospital, Abbottabad, Pakistan.
4. Medical Officer, Department of Anesthesiology, DHQ Abbottabad, Pakistan.
5. Assistant Professor, Department of Orthopedics, Ayub Teaching Hospital, Abbotabad, Pakistan.
6. Assistant professor, Pediatrics, PUMHSW, SBA.

Corresponding Author: Irfan Sarwar[1], Anesthetist, THQH Kahuta, Rawalpindi, Pakistan.**Email:** physioconcepts@yahoo.com

How to cite this article: Sarwar Irfan [1], Ayaz Attiya [2], Ammir K[3], Bashir N[4], Muhammad T[5,] Langah A[6] **ETIOLOGICAL RISK FACTORS FOR NEONATAL JAUNDICE.** *JPUMHS; 2022:12:01,14-22.*http://doi.org/10.46536/jpumhs/2022/12.01.344

Received Dec 12 2021, Accepted On 15 feb 2022, Published On 31 March 2022

INTRODUCTION

The medical disorder termed as hyperbilirubinemia is a condition in which build-up of bilirubin the blood takes place, leading to discoloration of the skin into yellow color [1]. This condition is commonly known as jaundice and in newly born children, the term neonatal jaundice is used. According to statistics revealed by CDC, globally around 1.1 million babies born develop the condition of hyperbilirubinemia, with a small number of cases also developing complications that can proceed into fatal outcomes [1]. This is why, the issue of neonatal jaundice is an over-reaching problem that can prove fatal if not managed effectively and on time. However, the study of Shaw and Devgan has noted that neonatal jaundice and its complications are related to economic stability and quality of healthcare, as majority of cases of hyperbilirubinemia reside in the area of South Asia and Sub-Sahara Africa [2]. This leads to the argument that complications from hyperbilirubinemia, including encephalopathy i.e., damage to the brain is most effective in low- and middle-income countries, with highest chances of morbidity rates as well. On the contrary, the study of Olusanya et al. believes that instead of economic precursors, neonatal jaundice and its complications are related to medical reasons of the mother [3]. This includes exclusive breastfeeding for the first few weeks after delivery, when mother already has deficiency of G6PD (Glucose-6-Phosphate Dehydrogenase) and UGT1A1 (Uridine Diphosphate Glucuronosyl Transferase 1A1 Gene) [3]. As a result, the baby is unable to receive the

nutritional value through breastfeeding required, and chances of hyperbilirubinemia and neonatal jaundice also increase.

However, it is important to note that neonatal jaundice is a normal occurrence, which is present in over 80% of the babies born [4]. The reason behind this is the naturally high levels of bilirubin the blood, which after natural transition usually decreases [4]. However, the issue of complications persists, when certain medical and physiological aspects of the baby are unmet. As a consequence, the study of Abbey, Kandasamy and Naranje has highlighted that unconjugated bilirubin in the blood increases to abnormal levels, which in later life can prognosis into neurotoxicity for the baby [5]. As a result, co-morbidities can develop including cerebral palsy, kernicterus and even hearing or vision loss[5]. Considering the implications that neonatal jaundice can have on the baby and their later life, it is pertinent to analyze the exact causes for such conditions. Therefore, the purpose of conducting this study is to review medical cases of neonatal jaundice, such that individual risk factors that etiologically proceed into development of jaundice in the baby can be identified.

This relates to the significance of this study, as identification of etiological risk factors will prove highly effective in avoiding the complications of the disease. As indicated in the study of Moreno (2015), risk factors for new-borne illnesses are likely related to healthcare quality being given to the mother during delivery[6]. This is why; economics and financial aspects of healthcare are also closely related to risk factors for neonatal jaundice. This is why, it can be stated that the findings of this study will prove highly significant in mitigating economic and healthcare related risk factors, such that complications like cerebral palsy and hearing losses can be avoided. To do so, this study has formulated a research question, which is:

"What are the etiological risk factors that increase incidence and mortality of neonatal jaundice in babies?"

RESEARCH METHODOLOGY

Research Philosophy and Design

The chosen philosophical approach for this study is Positivism, in which the researcher makes sure to play most minimal role during data analytics and forming conclusions[7]. The justification for choosing positivism for this research is due to the importance of objectivity in medical based researches. As stated in the study of Pham, positivism ensures that information is presented in a realistic manner, without any interpretation of findings [8] This effectively helps the study remain unbiased and non-prejudiced, which is why it can be ensured that etiological risk factors for neonatal jaundice are being categorized in an appropriate manner. Further, out of the qualitative and quantitative designs for scientific studies, the one chosen for this study is quantitative design. In quantitative research, numerical information, including statistics, graphs, tables and charts are used for presenting results[9]. As this format follows the objectivity aim of this study, therefore it is justified as the most appropriate research design. Besides, Queirós, Faria and Almeida has also stated that quantitative researches have least chance of error occurring, as data is collected, analyzed and then presented in a structured format [9] In this study, several medical statistics including the age of the mother, to time of delivery, resuscitation, UTI etc. have all been collected, which requires structured approaches to reduce any error.

Place and Duration of the Study

The place for conducting this study has been Pediatrics Unit, Ayub Teaching Hospital, Abbottabad. As it was feasible for the researcher to access medical records and communicate with patients in this hospital, therefore this place has been selected. In terms of the duration of the study, identification has been done at random, from November 2019 to February 2021.

Sampling

The sampling technique used in this study is termed as random sampling, in which certain individuals are chosen from a larger group of people to collect data[10]. The justification of opting for this is due to equal chance of collection of samples, which inadvertently decreases any researcher bias from the sampling process[11]. Therefore, using this technique, 105 patients have been analyzed and their medical information has been collected. This includes data on baby's weight, period of gestation/delivery, delayed cry, cardiac illnesses, respiration, congenital malformation, exchange transfusion from sibling etc.

To further identify the patients that were relevant to the study area, an inclusion and exclusion criteria has been established, given as follows:

Inclusion Criteria:

- Newborns born after 35 weeks of gestation.
- Admitted into NICU with Jaundice.

Exclusion Criteria:

- Newborns born before 35 weeks of gestation.
- Newborns presented with severe asphyxia, infections, abnormal direct serum bilirubin values, congenital diseases.
- Newborns whose records were incomplete.

STATISTICAL TEST AND DATA COLLECTION

Primary method of data collection has been used in this study, on the basis of which first hand medial data and user perspectives have been collected. The justification for choosing primary over secondary information is that it overcomes the issue of biased reporting[10].

As secondary studies have to be limited to the perspectives offered by other researchers, therefore reporting baseness can be included in results. To avoid such a scenario, this study has used primary data collection from 105 new-borne, with access to their medical records and seeking consent from their parents.[11] On the other hand, this data has been analyzed using SPSS software, which has been used because it provides scientific analytical tools within minimal time and after following only a few basic steps[12]. One sample t-test was conducted to analyze the data set obtained, which facilitated in gaining perspective on the variation of incidence of neonatal jaundice with respect to various group variables variations involved the research.

This is why; the justification for opting for statistical analysis is to ensure objectivity and effective analysis of collected information, with minimal intrusion of external factors.

ETHICAL CONSIDERATIONS

The need for ethical considerations in this study is based on the fact that firsthand medical data from vulnerable population is being collected. This is why, it is a necessity that the collected data is kept anonymous and protected from any third party excess, or else the credibility of entire research process can be jeopardised[13]. To do so, this study has followed sampling strategy of collecting data on anonymous transcripts after informed consent, with no collection of the baby's name, area of living or city. To further ensure safety of collected information, no third party has been excess, except for the researcher.

RESULTS

In order to investigate the major risk factors for neonatal jaundice, statistical correlation analysis was conducted. Results of the test are summarized in the following table. As evident from the results, umbilical vein catheterization has a significant and positive association with neonatal jaundice incidence. Similarly, it was found that respiratory distress in the initial stages after birth also increases the risk of neonatal jaundice in babies. However, the study did not find any significant correlation of the disease with any demographic factors including gender, date of birth, and weight.

35	Outcome	0.013	-0.046	-0.143	-0.121	0.046	0.164	0.089	.305**	0.111	-0.064	.267**	-0.098	-0.073	-0.122	0	-0.091	0.166	0.162	-0.008	-0.114	0.063	0.065	0.128	-0.064	0	-0.061	0.017	0.117	0.095	-0.058	0.105	-0.145	-0.1	1
34	Exchange transfusion in sibling	-0.088	0.037	0.032	0.169	-0.037	-0.077	-0.055	0.067	-0.032	-0.026	-0.082	0.035	0.109	0.071	0.055	.242*	-0.083	-0.007	-0.12	0.151	-.223*	-0.053	-0.026	-0.026	0.046	-0.044	.401**	-0.06	-0.011	0.12	-0.049	.297**	1	-0.1

24	25	26	27	28	29	30	31	32	33
Urine for red substance	**HIDA scan**	**Physiological Jundice**	**ABO incompatibility**	**RH incompatibility**	**G6PD deficiency**	**sepsis**	**prematurity**	**Hypoxic Ischemic enchephalopathy**	**History of jundice among sibling**
0.082	0.082	0.09	-0.142	-0.055	0.186	0.089	-0.178	0.066	-0.068
0.014	0.014	-0.024	0.072	0.061	0.031	-.210*	0.031	0.074	0.099
-0.041	0.122	0.024	-0.078	0.102	-0.139	-0.009	.297**	-0.038	0.084
-0.01	-0.01	0.017	-0.05	0.01	-0.022	-0.001	.799**	0.019	0.076
-0.014	-0.014	0.024	-0.072	-0.061	-0.031	.210*	.296**	.263**	-0.099
-0.028	-0.028	0.049	0.029	-0.126	-0.064	.356**	0.104	0.021	-0.051
-0.053	0.18	0.093	-.225*	-0.116	-0.122	.280**	0.091	.973**	-.241*
-0.028	-0.028	0.049	-0.06	0.069	.441**	-0.034	-0.064	0.021	0.178
-0.048	-0.048	0.083	-0.19	-0.082	-0.108	.258**	0.119	.857**	-.240*
-0.01	-0.01	0.017	-0.05	-0.043	-0.022	0.148	-0.022	0.185	-0.069
-0.03	-0.03	0.053	-0.074	-0.042	-0.068	.315**	0.091	0.167	-.217*
0.038	0.051	0.032	0.084	0.149	0.049	-.274**	0.009	0.049	.194*
0.047	-0.005	-0.022	0.092	0.168	0.172	-.297**	-0.143	-.354**	0.102
-0.127	0.087	0.128	-0.085	-0.026	-0.179	.198*	.247*	.269**	0.165
0.053	0.053	0.043	-0.054	0.116	0.122	-.280**	0.015	-0.15	-0.096
-0.014	-0.014	0.024	-0.072	0.128	-0.031	.210*	-0.031	0.095	0.049
0.031	-0.013	-0.102	-0.137	0.011	-0.151	.261**	0.062	.227*	-.268**
0.077	0.036	-0.058	-0.026	0.033	-0.074	.230*	0.037	-0.024	-0.084
-.302**	-.210*	-0.079	-0.082	0.04	0.027	-0.071	0.089	-0.034	-0.101
-0.175	0.055	-0.097	0.015	0.005	0.021	-0.025	-0.084	-.199*	0.067
0.118	-0.082	0.027	0.047	-0.051	-0.095	0.08	0.087	0.074	-0.137
-0.02	-0.02	0.034	0.02	-0.087	-0.044	.192*	-0.044	0.135	-0.035
1	-0.01	0.017	0.19	-0.043	-0.022	-0.065	-0.022	-0.052	-0.069
-0.01	1	0.017	-0.05	-0.043	-0.022	0.148	-0.022	0.185	0.139
0.017	0.017	1	0.088	-.235*	0.038	0.114	0.038	0.091	0
0.19	-0.05	0.088	1	-0.099	0.105	-0.188	-0.115	-.216*	0.083
-0.043	-0.043	-.235*	-0.099	1	-0.098	-0.179	0.023	-0.108	0.183
-0.022	-0.022	0.038	0.105	-0.098	1	-0.051	-0.05	-0.118	0.032
-0.065	0.148	0.114	-0.188	-0.179	-0.051	1	0.046	.250*	-0.073
-0.022	-0.022	0.038	-0.115	0.023	-0.05	0.046	1	0.098	0.032
-0.052	0.185	0.091	-.216*	-0.108	-0.118	.250*	0.098	1	-.228*
-0.069	0.139	0	0.083	0.183	0.032	-0.073	0.032	-.228*	1
-0.026	-0.026	0.046	-0.044	.401**	-0.06	-0.011	0.12	-0.049	.297**
0.128	-0.064	0	-0.061	0.017	0.117	0.095	-0.058	0.105	-0.145

11	12	13	14	15	16	17	18	19	20	21	22	23
Maternal UTI	**respiratory distress**	**Temprature**	**Reapiratory rate**	**Saturation**	**S_E**	**Meningitis**	**Total Bilirubin**	**Indirect bilirubin**	**Direct Bilirubin**	**Breast milk**	**Formula milk**	**History of infection in mother**
0.082	-0.022	0.127	0.127	-0.032	0.008	-0.026	-0.109	0.042	-0.072	-0.06	-0.094	-0.138
0.014	-.206*	0.118	0.019	-0.048	0.09	0.019	-0.033	-0.077	-0.062	-0.079	-0.026	0.028
0.02	0.028	0.072	-0.029	0.095	0.042	0	0.031	0.084	-0.012	0.074	0.076	0
-0.01	-0.03	0.088	-0.057	0.131	0.099	-0.014	0.129	0.073	0.049	0.055	0.018	-0.019
-0.014	.206*	-0.08	-0.119	.199*	-.256**	-0.019	0.057	0.031	0.072	-.249*	0.167	-0.028
.341**	.297**	-0.181	-.238*	0.059	-.271**	-0.04	0.153	0.091	0.11	-0.091	0.053	.693**
0.18	0.157	0.072	-.342**	.260**	-0.136	0.09	.248*	-0.011	-0.02	-0.183	0.054	0.129
-0.028	-0.088	-0.027	0.19	-0.146	-0.015	.223*	-.219*	-0.088	-0.09	-0.007	-0.093	-0.057
.202*	.198*	0.063	-.320**	.199*	-0.14	0.11	.244*	-0.066	0.047	-.194*	0.089	0.157
1	-0.03	-0.029	-.214*	-0.1	-0.18	-0.014	0.028	0.028	-0.028	-0.175	0.118	.493**
-0.03	1	-.261**	-.379**	0.179	-.400**	-0.043	.322**	0.175	.193*	-.227*	0.16	0.117
-0.029	-.261**	1	.239*	-0.116	.221*	-0.127	-0.121	-0.043	-0.042	-0.073	0.072	-0.09
-.214*	-.379**	.239*	1	-.364**	.407**	-0.026	-.211*	-0.156	-0.092	0.16	-0.061	-.302**
-0.1	0.179	-0.116	-.364**	1	-.260**	0.142	0.026	0.049	0.149	-0.096	-0.052	0.014
-0.18	-.400**	.221*	.407**	-.260**	1	-.256**	0.053	-0.013	0.013	0.173	0.038	-.247*
-0.014	-0.043	-0.127	-0.026	0.142	-.256**	1	-0.074	-0.028	-0.02	0.079	-0.116	-0.028
0.028	.322**	-0.121	-.211*	0.026	0.053	-0.074	1	.488**	0.18	-.255**	.291**	0.046
0.028	0.175	-0.043	-0.156	0.049	-0.013	-0.028	.488**	1	-0.052	-0.169	.227*	0.037
-0.028	.193*	-0.042	-0.092	0.149	0.013	-0.02	0.18	-0.052	1	-0.093	0.011	0.025
-0.175	-.227*	-0.073	0.16	-0.096	0.173	0.079	-.255**	-0.169	-0.093	1	-.632**	-0.005
0.118	0.16	0.072	-0.061	-0.052	0.038	-0.116	.291**	.227*	0.011	-.632**	1	-0.065
.493**	0.117	-0.09	-.302**	0.014	-.247*	-0.028	0.046	0.037	0.025	-0.005	-0.065	1
-0.01	-0.03	0.038	0.047	-0.127	0.053	-0.014	0.031	0.077	-.302**	-0.175	0.118	-0.02
-0.01	-0.03	0.051	-0.005	0.087	0.053	-0.014	-0.013	0.036	-.210*	0.055	-0.082	-0.02
0.017	0.053	0.032	-0.022	0.128	0.043	0.024	-0.102	-0.058	-0.079	-0.097	0.027	0.034
-0.05	-0.074	0.084	0.092	-0.085	-0.054	-0.072	-0.137	-0.026	-0.082	0.015	0.047	0.02
-0.043	-0.042	0.149	0.168	-0.026	0.116	0.128	0.011	0.033	0.04	0.005	-0.051	-0.087
-0.022	-0.068	0.049	0.172	-0.179	0.122	-0.031	-0.151	-0.074	0.027	0.021	-0.095	-0.044
0.148	.315**	-.274**	-.297**	.198*	-.280**	.210*	.261**	.230*	-0.071	-0.025	0.08	.192*
-0.022	0.091	0.009	-0.143	.247*	0.015	-0.031	0.062	0.037	0.089	-0.084	0.087	-0.044
0.185	0.167	0.049	-.354**	.269**	-0.15	0.095	.227*	-0.024	-0.034	-.199*	0.074	0.135
-0.069	-.217*	.194*	0.102	0.165	-0.096	0.049	-.268**	-0.084	-0.101	0.067	-0.137	-0.035
-0.026	-0.082	0.035	0.109	0.071	0.055	.242*	-0.083	-0.007	-0.12	0.151	-.223*	-0.053
-0.064	.267**	-0.098	-0.073	-0.122	0	-0.091	0.166	0.162	-0.008	-0.114	0.063	0.065

	1	2	3	4	5	6	7	8	9	10
	Gender	**Date of birth**	**Weight**	**Period of gestation**	**MSL**	**Maternal injection**	**Delayed cry**	**Umblical vein catheterization**	**Resuscitation at birht**
Gender	1	0.026	-0.129	-0.156	-0.026	-0.053	0.038	0.166	-0.04
Date of birth	0.026	1	-0.116	0.014	0.019	0.04	0.076	0.04	0.068
Weight	-0.129	-0.116	1	.363**	-0.145	-0.037	-0.042	-0.104	-0.03
Period of gestation	-0.156	0.014	.363**	1	-0.014	0.118	0.017	-0.101	0.027
MSL	-0.026	0.019	-0.145	-0.014	1	-0.04	.256**	-0.04	.287**
Maternal injection	-0.053	0.04	-0.037	0.118	-0.04	1	0.015	-0.082	0.044
Delayed cry	0.038	0.076	-0.042	0.017	.256**	0.015	1	0.015	.891**
Umblical vein catheterization	0.166	0.04	-0.104	-0.101	-0.04	-0.082	0.015	1	0.044
Resuscitation at birht	-0.04	0.068	-0.03	0.027	.287**	0.044	.891**	0.044	1
Maternal UTI	0.082	0.014	0.02	-0.01	-0.014	.341**	0.18	-0.028	.202*
respiratory distress	-0.022	-.206*	0.028	-0.03	.206*	.297**	0.157	-0.088	.198*
Temprature	0.127	0.118	0.072	0.088	-0.08	-0.181	0.072	-0.027	0.063
Reapiratory rate	0.127	0.019	-0.029	-0.057	-0.119	-.238*	-.342**	0.19	-.320**
Saturation	-0.032	-0.048	0.095	0.131	.199*	0.059	.260**	-0.146	.199*
S_E	0.008	0.09	0.042	0.099	-.256**	-.271**	-0.136	-0.015	-0.14
Meningitis	-0.026	0.019	0	-0.014	-0.019	-0.04	0.09	.223*	0.11
Total Bilirubin	-0.109	-0.033	0.031	0.129	0.057	0.153	.248*	-.219*	.244*
Indirect bilirubin	0.042	-0.077	0.084	0.073	0.031	0.091	-0.011	-0.088	-0.066
Direct Bilirubin	-0.072	-0.062	-0.012	0.049	0.072	0.11	-0.02	-0.09	0.047
Breast milk	-0.06	-0.079	0.074	0.055	-.249*	-0.091	-0.183	-0.007	-.194*
Formula milk	-0.094	-0.026	0.076	0.018	0.167	0.053	0.054	-0.093	0.089
History of infection in mother	-0.138	0.028	0	-0.019	-0.028	.693**	0.129	-0.057	0.157
Urine for red substance	0.082	0.014	-0.041	-0.01	-0.014	-0.028	-0.053	-0.028	-0.048
HIDA scan	0.082	0.014	0.122	-0.01	-0.014	-0.028	0.18	-0.028	-0.048
Physiological Jundice	0.09	-0.024	0.024	0.017	0.024	0.049	0.093	0.049	0.083
ABO incompatibility	-0.142	0.072	-0.078	-0.05	-0.072	0.029	-.225*	-0.06	-0.19
RH incompatibility	-0.055	0.061	0.102	0.01	-0.061	-0.126	-0.116	0.069	-0.082
G6PD deficiency	0.186	0.031	-0.139	-0.022	-0.031	-0.064	-0.122	.441**	-0.108
sepsis	0.089	-.210*	-0.009	-0.001	.210*	.356**	.280**	-0.034	.258**
prematurity	-0.178	0.031	.297**	.799**	.296**	0.104	0.091	-0.064	0.119
Hypoxic Ischemic enchephalopathy	0.066	0.074	-0.038	0.019	.263**	0.021	.973**	0.021	.857**
History of jundice among sibling	-0.068	0.099	0.084	0.076	-0.099	-0.051	-.241*	0.178	-.240*
Exchange transfusion in sibling	-0.088	0.037	0.032	0.169	-0.037	-0.077	-0.055	0.067	-0.032
Outcome	0.013	-0.046	-0.143	-0.121	0.046	0.164	0.089	.305**	0.111

Outcome of the study

Through the one-simple t -test, it was revealed that only Umbilical vein catheterization and respiratory distress were the group variables which had relation with variation in the incidence of neonatal jaundice. Both, Umbilical vein Catheterization and respiratory distress were also positively associated with the outcome of neonatal jaundice. Meanwhile, the other variables involved showed weak statistical association with group variable variation.

DISCUSSION

The main purpose of conducting this study has been to identify risk factors towards the illness of neonatal jaundice, caused as a result of hyperbilirubinemia. The results of this study have shown largely weak correlation for most of the medical data collected in order to analyse outcome for neonatal jaundice. However, the singular factor of umbilical vein catheterisation has provided a significant correlation with patient outcomes. This means that when umbilical catheters are used for feedings the baby, it usually correlates with the presence of higher concentration of conjugated bilirubin in the blood of the baby. This is directly associated to the nutritional intake of the baby, as the study of Huang et al. has highlighted that decreased nutritional intake, irrespective of the cause is correlated as a risk factor for neonatal jaundice[14]. To explain this correlation, literature has also identified the practice of breastfeeding to enable lower nutrition and need for umbilical catheterisation[14].

This provides the explanation for the high correlation between children's neonatal jaundice and catheterization of the umbilical vein in newborns. As breastfeeding issues with difficulty in nursing can decrease the amount of nutrition being given to the baby, this is why the nutritional intake of the baby can decrease. As nutritional intake decreases, dehydration and even low calories in the body can initiate the development of jaundice in the newborn baby[7].

This is why, it can be argued that catheter usage in the baby is directly associated with nutritional uptake of the baby, out of which breastfeeding makes up a significant risk factor.

However, another significant risk factor to neonatal jaundice that is related to nutritional intake is premature birth. The results from this study have shown only moderate correlation between the independent variable of prematurity and dependent variable of outcome, although literature has shown direct association between the two variables. Babies born before 38 weeks of gestation have an undeveloped organ system, which adds to their inability to process bilirubin and discharge it from the body, resulting in hyperbilirubinemia and consequently neonatal jaundice as well. The dissociation between the study's findings and literary reports can be pinpointed to the moderate co relational values, as the given sample may have only moderate correlation. However, Mohtahedi et al. have concluded that nutritional intake and baby's early delivery is related to the presence of neonatal jaundice among neonates, which leads to the argument premature delivery is also a significant risk factor for neonate jaundice [10]. Similarly, another significant risk factor that has shown moderate association in the results is deficiency of G6PD. The correlational value recorded for this study indicates towards low to moderate correlation, but the study of Jie et al. has identified this deficiency to be directly associated with neonatal jaundice [9]. However, the study has added that such associations are most common among South Asian and Sub-Saharan African population[9]. Comparing to the current study's findings, it can be deduced that G6PD deficiency and inter-relation of neonatal jaundice is associated with the ethnicity of the individual, with only certain ethnicities exhibiting this as an etiological risk factors. Furthermore, high correlation has also been identified for the risk factor of respiratory distress, which means that oxygen levels in the blood of the baby are decreased. This notion of respiratory distress is related to delivery and climate around the baby. As the study of Scrafford et al has identified warm air climate and prolonged delivery to be significant factors in causing neonatal jaundice in the babies[15.] As prolonged delivery is likely to increase distress on the baby, therefore respiratory distress is related to other physiological parameters as well. On the other hand, climatic conditions that inhibit ease of breathing also constitute the lowered oxygen levels in the blood, which inadvertently leads to depleted ability of the neonate's organs to breakdown bilirubin in the blood [16]. As a consequence, respiratory distress can be linked as an etiological risk factor towards neonate jaundice. However, for this variable, literature has provided discrepant results, as the study found no correlation between respiratory problems and jaundice or hyperbilirubinemia [7]. This leads to the argument that variation in these results require further exploration, in order to exactly pinpoint the reason that respiratory distress does or does not cause neonatal jaundice and hyperbilirubinemia. However, it is also important to point out aspects that have insignificant effects on the outcome of neonatal jaundice among the study sample. The least correlation value has been measured for sepsis, which is at 0. This indicates that infection and jaundice are not inter-related, which can be noted to the prognosis of the disease. As explained by

literature, neonatal jaundice is considered to be a physiological jaundice, as solely the body's inability to breakdown bilirubin leads to yellow colorations of the skin[18]. This is why, micro-organisms or any infections in the body do not enable development of the disease, although it can be related to arising complications. Similarly, use of formula milk is not linked to neonatal jaundice, as nutritional intake is a significant etiological risk factor, with the formula milk having no association with baby's nutritional intake. On the other hand, meningitis is also not significantly correlated with neonatal jaundice, as seen in literary findings conducted on the subject [14-9]. Similar outlook has been provided in this study as well, with swelling of the brain and spinal cord membrane only showing low correlation with the outcome of hyperbilirubinemia. Morbidity of the disease of neonatal jaundice is associated with the complications that may arise. According to the study of Hansen et al., complications arise when the early hours of critical care in a neonate are unable to manage bilirubin levels in the blood [8] As a result, the bilirubin in blood exceeds to abnormal amounts that is destructive to the body, leading to complications in development and even death. From the results, it can be seen that Hypoxic Ischemic enchephalopathy has moderate correlation with the outcome of neonatal jaundice. Therefore, it can be argued that jaundice in newborns is related to the amount of oxygen being transported to the brain.[18-22]. As the oxygen transport is affected, conditions like Hypoxic Ischemic encephalopathy arise in the baby leading to brain damage. In such a condition, Riordan and Gazzin have highlighted that brain damage can lead to hearing losses, kernicterus, fever and improper development of limbs and even teeth [3]. For morbidity, initial level bilirubin levels in the baby can lead to death, when brain damage exceeds a certain level and therapeutic efforts become in effective for the baby. However, in this regards economics of parents and healthcare quality is of importance, as literature has identified accessibility to quality healthcare as one of the factors associated with neonatal complications and morbidity [7] Therefore, considering this information on the topic, it can be argued that morbidity from neonatal jaundice is related to the health professional's management of baby's symptoms for neonatal jaundice. In case, early management is not ensured, then complications that impact the brain can arise leading to fatality as well.

CONCLUSION

In this study, a review of associated risk factors for neonatal jaundice in the study population has been done, with identification of significant etiological risks that ensure greater incidence of the disease.. Formula milk methods for feeding the baby therefore have low correlation in prognosis of neonatal jaundice, making it an insignificant etiological risk factor. On the other hand, respiratory distress has shown strong correlation with neonatal jaundice, although literature has shown variation in the results. It can be concluded that future research is required on the subject through identification of key patterns that make respiration an issue for neonatal jaundice. In terms of morbidity rates and their association with neonatal jaundice, the study has also reviewed complications of the disease. Findings on this to subject have led to the conclusion that neonatal jaundice complications that affect the brain of the baby are most likely to cause higher death rates, as meningitis and sepsis may enable morbid outcomes. However, further research is required into the subjects, in order to differentiate between manageable complications hypoxic ischemic encephalopathy and conditions in which fatality becomes imminent.

ETHICS APPROVAL: The ERC gave ethical review approval

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin

FUNDING: The work was not financially supported by any organization. The entire expense was taken by the authors

ACKNOWLEDGEMENTS: We would like to thank the all contributors and staff and other persons for providing useful information.

AUTHORS' CONTRIBUTIONS: All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTEREST: No competing interest declared.

REFERENCES

1. CDC. What are Jaundice and Kernicterus? Centre for Disease Control [Online] 2021. Viewed 1 December 2021. Available at: https://www.cdc.gov/ncbddd/jaundice/facts.html
2. Shaw SC, Devgan A, Bilirubin estimation from smartphone imaging of skin of newborns. Acta Paediatr, 2020. pp.2822-2822.

3. Olusanya BO, Osibanjo FB, Mabogunje CA, Slusher TM, Olowe SA. The burden and management of neonatal jaundice in Nigeria: a scoping review of the literature. Nigerian journal of clinical practice, 2016. 19(1), pp.1-17.
4. Mitra S, Rennie J. Neonatal jaundice: aetiology, diagnosis and treatment. British Journal of Hospital Medicine, 2017. 78(12), pp.699-704.
5. Abbey P, Kandasamy D, Naranje P. Neonatal jaundice. The Indian Journal of Pediatrics, 2019. 86(9), pp.830-841.
6. Moreno MA. Common questions about neonatal jaundice. JAMA pediatrics, 2015. 169(3), pp.296-296.
7. Ryan G. Introduction to positivism, interpretivism and critical theory. Nurse researcher, 2018. 25(4),pp.41-49.
8. Pham LTM. Qualitative approach to research a review of advantages and disadvantages of three paradigms: Positivism, interpretivism and critical inquiry. University of Adelaide. 2018.
9. Queirós A, Faria D, Almeida F. Strengths and limitations of qualitative and quantitative research methods. European Journal of Education Studies. 2017.
10. Pandey, P. and Pandey, M.M., 2021. Research Methodology Tools and Techniques.
11. Etikan I, Bala K. Sampling and sampling methods. Biometrics & Biostatistics International Journal, 2017. 5(6), p.00149.
12. George D, Mallery P. IBM SPSS statistics 26 step by step: A simple guide and reference. Routledge. 2019.
13. Flick U. Introducing research methodology: A beginner's guide to doing a research project. 2015.
14. Jie ZHANG, Zhen, LI, Fang WU, Ya-chun LI. Analysis of etiology and clinical features of 431 cases of neonatal jaundice. Chinese Hepatolgy, 2021. 26(6), p.677.
15. Scrafford CG, Mullany LC, Katz J, Khatry SK, LeClerq SC, Darmstadt GL. Tielsch JM. Incidence of and risk factors for neonatal jaundice among newborns in southern N epal. Tropical Medicine & International Health, 2013. 18(11), pp.1317-28.
16. Shwe S. Evaluation Of Molecular Markers Associated With Significant Neonatal Hyperbilirubinemia Of The Three Ethnic Groups In Malaysia (Doctoral dissertation, UTAR). 2020.
17. Hansen TWR. The epidemiology of neonatal jaundice. 2021.
18. Awang H, Ja'afar SM, Ishak NAW, Dollah Z. Determinants of neonatal jaundice among newborns in Pasir Putehdistrict, Kelantan. International Journal of Public Health and Clinical Sciences, 2020. 6(6), pp.109-122.
19. Huda WM, Sharma P, Aggarwa J, Agrawal A. A comparative study of cord blood bilirubin and albumin as a predictor for neonatal jaundice in term newborns. Journal of Datta Meghe Institute of Medical Sciences University, 2021. 16(2), p.295.
20. Riordan SM, Gazzin, S. Where do we stand in the field of neonatal jaundice? Commentary on the 2017 J. Donald Ostrow Trieste Yellow Retreat. Pediatric research, 2018. 83(6), pp.1090-1092.
21. Brits H, Adendorff J, Huisamen D, Beukes D, Botha K, Herbst H, Joubert, G. The prevalence of neonatal jaundice and risk factors in healthy term neonates at National District Hospital in Bloemfontein. African Journal of Primary Health Care and Family Medicine, 2018. 10(1), pp.1-6.
22. Mojtahedi SY, Izadi A, Seirafi G, Khedmat L. Tavakolizadeh R. Risk factors associated with neonatal jaundice: A cross-sectional study from Iran. Open access Macedonian journal of medical sciences, 2018. 6(8), p.1387.