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Management of Third Stage of Labour

Highlights

Infections in Caesarean Sections

Exploring the Incidence and Determinants

Discovering Thoughts, Inventing Future

VOLUME 24 ISSUE 2 VERSION 1.0

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Exploring the Incidence and Determinants of Surgical Site Infections in Caesarean Sections: A Five-Year Study

By Nirupama Padmaja Bondili, Pallavi Chandra Ravula, Sapam Anju Devi & Sadguna Gurrampally

Abstract- *Background:* Surgical site infection (SSI) is one of the most common complications following a cesarean section and has an incidence of 0.63 to 9.85%. It places physical, emotional and financial burden on the mother herself and on the health care system.

Aims and Objectives: The study aimed to identify and analyze the risk factors associated with SSIs in women undergoing both elective and emergency cesarean sections and to assess the risk factors and propose modifications to preoperative, intraoperative and postoperative practices to reduce the incidence of SSI. Optimization of maternal comorbidities, appropriate antibiotic prophylaxis, and evidence-based surgical techniques are some of the practices proven to be effective in reducing the incidence of SSI.

Keywords: *surgical site infections (SSI), cesarean section, risk factors, maternal health, infection control.*

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Exploring the Incidence and Determinants of Surgical Site Infections in Caesarean Sections: A Five-Year Study

Nirupama Padmaja Bondili [α], Pallavi Chandra Ravula [σ], Sapam Anju Devi [ρ] & Sadguna Gurrampally [ω]

Abstract- ***Background:*** Surgical site infection (SSI) is one of the most common complications following a cesarean section and has an incidence of 0.63 to 9.85%. It places physical, emotional and financial burden on the mother herself and on the health care system.

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Methodology: This was a 5- year observational study conducted at Fernandez Hospital from 2018 to 2022. This study included all case records of women who had caesarean sections at Fernandez Hospital.

Results: The incidence of SSI during the study period was 1.03%. It is found that, overweight and obesity were strongly correlated with increased SSIs. Overweight, Class I obese women, class II obese women and class III obese women were respectively 2.332 times (adjusted OR: 2.332; 95% CI: 1.432 to 3.799), 6.548 times (adjusted OR: 6.548; 95% CI: 4.071 to 10.530), 14.061 times (adjusted OR: 14.061; 95% CI: 8.360 to 23.650), and 37.349 times (adjusted OR: 37.349; 95% CI: 21.444 to 65.051) more likely to have SSI as compared to women with normal BMI. Emergency cesarean sections significantly increased SSI risk compared to elective cesareans (adjusted OR: 1.476, $p<0.001$). Rupture of membranes, women undergoing IOL, women who had more than 5 vaginal examinations and PPH are significant among the other risk factors. Most common isolates are Escherichia coli and Staphylococcus aureus.

Conclusion: The SSI rates at the study site were within the benchmark set for the institute, by taking precautions while dealing with the above mentioned, high- risk group of women.

Keywords: surgical site infections (SSI), cesarean section, risk factors, maternal health, infection control.

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I. Introduction

Caesarean section is the most common surgical procedure performed worldwide. Rising rates are attributed to various medical and non-medical factors[1]. With an increase in the number of cesarean sections, there is a significant increase in the number of SSIs[2,3]. The incidence of SSI following cesarean section worldwide has been reported to range between 0.63 to 9.85%[4–6]. SSIs are the most common health care associated infections (HAI) in India. The incidence of post caesarean SSI in India varies from 3.1 to 24.2%[7,8]. This trend emphasizes the need for robust surveillance and preventive strategies to mitigate the risk of SSIs. This will help to develop targeted interventions to reduce SSIs and improve patient outcomes.

There is a dearth in the existing literature with large data sets of Indian studies and there is lack of uniformity in practices. This study aims at bringing in the uniformity in post operative practices to bring down the SSI rates to acceptable rates. The SSI rates in India differ from international numbers based on the patient demographics, hospital settings, resource limitations and infrastructure etc.

Caesarean sections have a low procedure-level risk of infection as they are considered as clean wound type. Most SSIs after caesarean are preventable with adherence to infection control strategies and good surgical practices.

SSI post cesarean section is defined as an infection that occurs at or near the surgical site within 30 days of the procedure[9]. SSI can be because of contamination before the surgery (traumatic injuries), contamination from the patient (skin flora) or contamination during the surgery (staff, equipment). It is considered as SSI, if one of the following is *observed or reported:*

- A purulent (pus) discharge in, or coming from, the wound (including evidence of an abscess) OR
- Evidence of fever with painful, spreading erythema surrounding the surgical site OR
- Any reopening of the surgical wound

The diagnosis of wound infection does not require bacteriology / laboratory confirmation. Sometimes, it is difficult to identify the causative organism, because multiple organisms are often found in a single infected wound. Most of the time, anaerobes play a major role. SSIs are classified as superficial (involving only the skin and subcutaneous tissue), deep (discharging wounds with deep tissue involvement of the fascial and muscle layers) and organ space SSIs (extend beyond the facial and muscle layers)[10]. Each type presents distinct clinical challenges and requires specific management approaches. Understanding the classification of the SSI and the microbiological profile of these infections is essential for optimizing the treatment regimens. Most of the superficial SSI are managed symptomatically with dressings or antibiotics while deep SSI need surgical interventions.

This study aims to provide comprehensive insights into the incidence and the risk factors following Caesarean sections from a five-year period data.

Primary Objective:

- To determine the incidence of surgical site infections (SSI) following caesarean section.

Secondary Objectives:

- To analyse the risk factors associated with SSIs in women undergoing both elective and emergency caesarean sections.
- To classify SSIs into superficial, deep, or organ space infections.
- To identify and analyse the bacterial isolates in the cases of SSI and plot an antibiogram for the institute.

II. Materials and Method

This 5- year observational study was conducted at Fernandez Hospital, a tertiary care referral centre in Hyderabad, Telangana, India, specializing in obstetrics, gynaecology, and neonatology. Utilizing data from five years, the study included all women who had caesarean sections at the study site from January 2018 to December 2022, with patients being followed up to 30 days post-operative period. The reason for choosing this study period was the introduction of the HICC (Hospital Infection Control Committee) team with ICO (Infection Control officer) and ICN (Infection Control Nurse). Data collection was done meticulously, and a standard protocol was practiced. Data were sourced from medical records and hospital infection control surveillance data, encompassing all confirmed cases of surgical site infections (SSIs) during this period.

The women who underwent caesarean sections at other hospitals but came to the study site for follow-up of wound infection and women who were lost to follow-up after caesarean section were excluded. The reason for excluding women who had caesareans in other hospitals was the possibility of difference in practices and inability to get the details of pre OP intra OP and post OP findings.

Hospital protocol: A surgical safety check list adapted from WHO has been used at the study site for monitoring and surveillance. The institute follows usage of single dose antibiotic prophylaxis 30 to 60 minutes prior to the surgical incision[11].

Surveillance: The study procedure involved surveillance of caesarean births, starting from post-operative day 1, continuing as inpatients, and extending up to 30 days post-caesarean sections. This surveillance was carried out by designated staff, including a dedicated staff nurse and the Infection Control Nurse (ICN). The role of ICN was to train the staff in following the set practices in reducing the SSI and follow up the women in the immediate postoperative period, sensitize them about the practices to be followed at home and alerts to visit the hospital after discharge. Data collection methods included postnatal visit forms, with relevant information recorded and maintained as excel sheets. The data was collected in real- time and was entered in the excel sheets. The ICN s were trained to maintain standard data collection and entry. The Infection Control Officer (ICO) analysed the collected data and discussed it with clinicians during monthly Hospital Infection Control Committee (HICC) meetings to identify and address gaps in infection prevention measures. The SSI rate was calculated. The organizational benchmark for SSI was set at 2% with the consensus of HICC based on the Institutional records. Ethical considerations were strictly adhered to throughout the study.

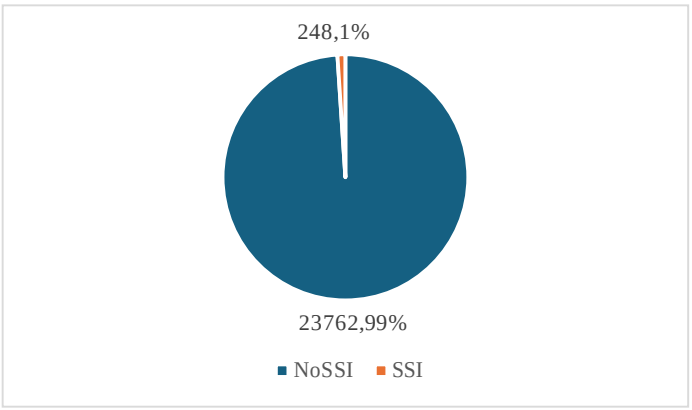
Statistical analysis: Descriptive analysis was carried out by frequency and proportion for categorical variables. Continuous variables were presented as median (IQR) due to non-normal data. The chi-square test was used to test the statistical significance of cross-tabulation between categorical variables. Mann-Whitney U test was used to compare the median (IQR) of continuous variables between two groups. Binary logistic regression was used to assess the predictors of the outcome.

P value < 0.05 was considered statistically significant. RStudio Desktop latest version was used for statistical analysis. (Reference: *R Studio Team (2024). R Studio: Integrated Development for R. R*

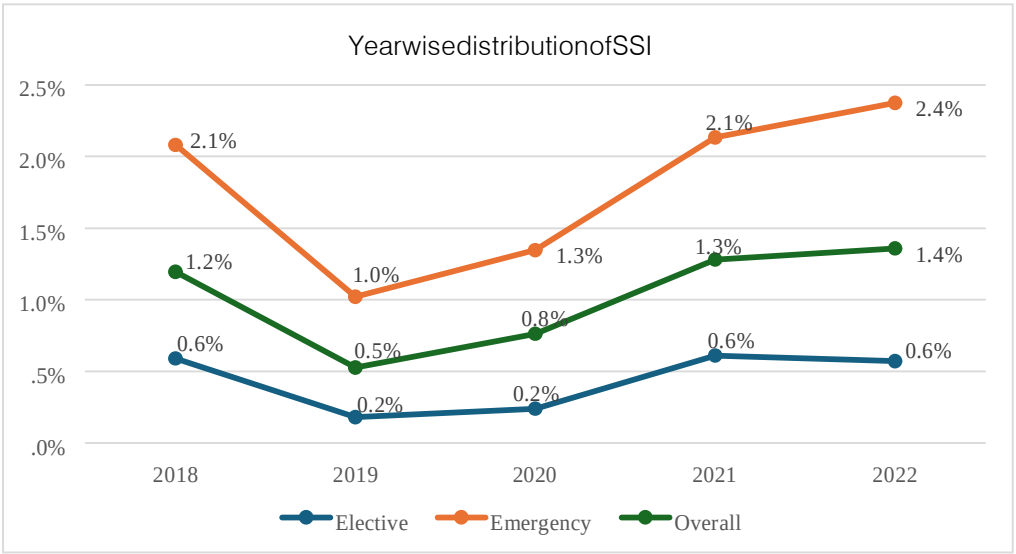
Studio, PBC, Boston, MA URL http://www.rstudio.com/.)

III. Results

A total of 24,010 women had cesarean sections in the study period. Out of these 13628 (56.7%) were elective and 10382 (43.2%) were emergency cesarean sections. A total of 248 women had SSI during the study period with an incidence of 1.03%. The SSI rate following elective caesarean was 0.44% (60/13628) and SSI rate after emergency caesarean was 1.81% (188/10382).



Pie Chart: SSI among CS deliveries (N=24010)



Year wise distribution of SSIs

The baseline characteristics of the patients with SSI are mentioned in Table 1.

Most SSIs occurred in the 20 to 34 years age group (82.7%), with a small proportion in the <= 19 years (0.8%) and >= 35 years (16.5%) age groups. There was a significant variation in SSI cases across different BMI categories. The incidence of SSI was directly proportional to BMI. The distribution of SSI cases between preterm and term cases were 27.8% and 72.2 % respectively. Out of the total SSI 24.2% were following an elective caesarean section and 75.8% were following an emergency caesarean section. 34.7% of the women were Diabetic and 22.2% of the women had hypertensive disorders in pregnancy. 92.7% of the women had singleton pregnancies and 7.3% of the pregnancies were multifetal.

Table 2 compares the basic and obstetric characteristics between the SSI group and the control group.

When compared with the control group, SSI group had higher incidence in women with Class I, Class II and Class III obesity with a significant p value. Emergency LSCS, prelabour rupture of membranes and PPH also showed a significant difference in SSI group when compared with the control group with no SSI.

Table 3 explains the logistic regression to assess the risk factors of SSI.

Higher age, obesity, emergency cesarean section, prelabour rupture of membranes and PPH were found to be significant predictors of SSI following a cesarean section according to univariate analysis ($p<0.05$). Those variables with $p<0.05$ in the univariate analysis were included in the multivariable analysis. Women aged between 20 to 34 were 44.9% (adjusted OR: 0.551; 95% CI: 0.385 to 0.789) less likely to have SSI following CS as compared to women aged >=35 years. Overweight, Class I obese women, class II obese women and class III obese women were respectively 2.332 times (adjusted OR: 2.332; 95% CI: 1.432 to 3.799), 6.548 times (adjusted OR: 6.548; 95% CI: 4.071 to 10.530), 14.061 times (adjusted OR: 14.061; 95% CI: 8.360 to 23.650), and 37.349 times (adjusted OR: 37.349; 95% CI: 21.444 to 65.051) more likely to have SSI as compared to women with normal BMI. Women with emergency cesarean section were 3.822 times (adjusted OR: 3.822; 95% CI: 2.735 to 5.340) more likely to have SSI compared to women with elective cesarean section. Women with PPROM/PROM were 3.75 times (adjusted OR: 3.750; 95% CI: 2.731 to 5.149) more likely to have SSI following cesarean section as compared to women without rupture of membranes. Women with PPH were 1.711 times (adjusted OR: 1.711; 95% CI: 1.167 to 2.508) more likely to have SSI following cesarean section as compared to women without PPH.

Table 4 presents a comparison of various risk factors between elective (n=60) and emergency (n=188) cesarean sections. This detailed comparison highlights the statistically significant difference between the elective and emergency cesarean sections in terms of risk factors such as BMI, Induction of labor, number of vaginal examinations, intrapartum pyrexia and rupture of membranes. Other factors, including age, hypertensive disorders, Diabetes mellitus, autoimmune disorders, PPH, anemia and gestational age did not show significant differences between the two groups.

Majority of the SSI cases (99.19%) were classified as superficial, and 2 cases (0.8%) were classified as deep SSI. The average number of days that the women came back with complaints post-surgery was 10.22 days. Most common complaint was purulent discharge and skin gape at the suture site (31.5%). The commonest organisms isolated in the wound swabs were Escherichia Coli (23%), Staphylococcus aureus (21,4%) followed by Enterococcus fecalis (16.1%) and Klebsiella Pneumoniae (15.7%). In 32 cases (12.9%) no organism was isolated from the wound culture as shown in graph 1.

Organisms isolated from the wound swabs

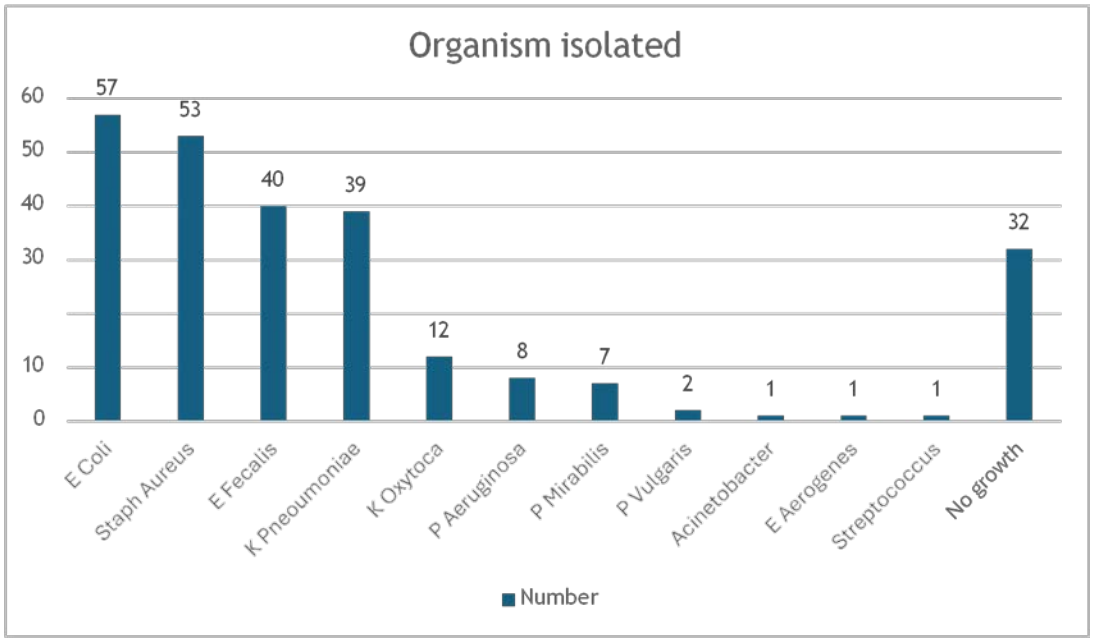


Table 5 highlights the distribution and associations of different organisms isolated from SSI cases with clinical conditions. E. Coli (24.4%), Staphylococcus aureus (18.6%), Klebsiella Pneumoniae (14%) and Enterococcus faecalis (11.6%) are significantly associated with diabetes mellitus.

Of these 248 SSI cases, 241 (97.17%) were managed by conservative management, antibiotics and 7 cases (2.82%) required surgical intervention.

Tables 6 and 7 show the antibiogram plotted for 5 years data taking all the LSCS wound swab samples data. Bacteriological analysis is done in different medical conditions. Antibiogram is plotted

following the "*CLSI M39: guidelines for the preparation and use of antibiograms".* Antibiogram for 5 years data taking all the LSCS wound swab samples data was plotted. Antibiotic susceptibility is followed by the CLSI guidelines for the year and Cascade reporting is followed while reporting. As the study population involves mostly naïve mothers without prior exposure to high end antibiotics the sensitivity pattern is very good. The Gram-negative isolates are sensitive to 3rd generation cephalosporins/ BLI preparations, Carbapenems, Aminoglycoside and Fluroquinolones. The Gram-positive isolates are sensitive to Beta lactams, Vancomycin, Fluroquinolones.

IV. Discussion

The findings of this study highlight important factors influencing the incidence of surgical site infections (SSIs) among women undergoing cesarean sections. This study found SSI incidence of 1.03% among caesarean deliveries. In a study done at a teaching hospital by Basany K et al showed SSI incidence as 4.6% and another study done by Hirani S et al showed an SSI incidence of 5.63% which is higher than the current study[7,12] . The prevalence of SSI in Polish hospitals and at a study site in Kenya was reported to be 0.5% and 2.1% respectively indicating varied incidences of SSI in different setups[13,14]. Basany et al showed that 99% of cases were labelled as superficial SSI which is the incidence at the study site[12]. The current study highlights a strong association between higher BMI and increased SSI risk, particularly in the obese and overweight categories.

This aligns with findings from a meta- analysis by Carter et al who reported that obesity is a significant risk factor for SSIs in caesarean sections[15]. A study done by Astha Regmi et al in Nepal also had women with obesity having a higher risk of SSI than those with normal weight and underweight (adjusted OR 15.72 (4.60- 53.67) at p value of <0.001)[16]. Both studies emphasize the need for targeted interventions to restrict weight gain in pregnancy. Emergency caesarean sections had more SSI when compare to elective caesareans which is similar to the study by Panwar D et al and Chhetry et al[8,17] . This is similar to the other studies[18,19]. The increased risk of SSIs in emergency caesarean sections observed in this study is supported by previous research by Gomaa et al. with emergency CS (AOR 2.16; 95% CI =1.61-2.51)(20). The significant association between the number of vaginal examinations and SSIs ($p<0.001$) is similar to the results of the meta- analysis done in Ethiopia which showed that repeated digital vaginal examination increased the risk of surgical site infection by 3.80 times than the counter parts (AOR = 3.80, 95% CI; (2.45–5.88)[21]. Rupture of membranes was associated with a significant increase in the risk for SSI which is similar to the prospective cohort study done in Ethiopia which showed that the odds of developing an infection after a cesarean section with a history of rupture of membranes was two-fold higher than those without rupture of membranes (AOR: 2.10, 95% CI: 1.04, 4.24)[22]. The timing of antibiotic prophylaxis did not show significant impact on SSI rates ($p=0.683$). These results corroborate the findings of Baaqeel et. al, who emphasized the importance of timely antibiotic administration to reduce SSIs[23]. The duration of surgery did not show a significant difference when compared to previous studies such as those by Olsen et al[24]. who documented that prolonged operative time increases the risk of infections due to prolonged exposure and the potential for bacterial contamination. Similar studies highlight the need for enhanced infection control measures during emergency caesarean sections. While evaluating the risk factors for SSI in correlation with the maternal medical diseases, the results did not show any significant correlation with diabetes, hypertension or autoimmune disorders as significant risk factor for SSIs. Most of the studies quoted the correlation between diabetes and SSI[25], which is not the same in the current study as most of the women had good glycaemic control during pregnancy. This emphasises the importance of maintaining normoglycemic state. Induction of labour and PPH were also significantly associated with SSI when compared with the control group similar to other studies[26,27].

The predominance of Escherichia coli and Staphylococcus aureus in the study mirrors findings from previous studies, such as those by Haas et al., and other studies[28–31]. The presence of Enterococcus faecalis and other organisms like Klebsiella pneumonia and Pseudomonas aeruginosa in this study suggests a broad spectrum of potential pathogens, emphasizing the need for culture-specific treatment strategies.

Strengths of the study: The strengths of this study lie in its comprehensive real time data collection over five years and rigorous statistical analysis, providing robust insights into the epidemiology and risk factors of SSIs in this setting. The antibiotic policy and the surgical safety checklist have been followed at the study site was as per the WHO criteria. Women were followed up to 30 days postpartum as per the CDC criteria and a team of HICC was constantly monitoring the cases.

Limitations of the study: The results may not reflect the other centres in India as the socio- demographic, medical and obstetric risk factors may not be matched with the other centres in India.

V. Conclusion

The current study's findings highlight the critical need for management of women with high BMI, optimizing maternal medical conditions such as diabetes mellitus, limiting the number of vaginal examinations during labour, and stringent infection control in emergency surgeries and strict adherence to infection control practices. The identification of prevalent organisms and strict compliance with surgical prophylaxis followed by targeted antimicrobial therapy will help reduce the unnecessary use of high-end antibiotics and antimicrobial resistance. The hospital introduced SSI bundle and IPC (Infection Prevention and Control) campaign from 2023, and the month of May has been dedicated to teaching and training the health care workers on infection control practices. Antimicrobial stewardship policy has been implemented strictly adhering to Antibiotic policy of the organization. SSI surveillance is an ongoing process, and a prospective study and publication is planned to look at the impact of introduction of the SSI bundle and IPC campaign on further reducing the SSI rates.

Table 1: Baseline Characteristics of the SSI group (N=248)

Variables	Frequency	Percentage
Age, n (%)		
<= 19 years	2	0.8%
20 to 34 years	205	82.7%
>= 35 years	41	16.5%
BMI, n (%)		
Underweight	0	0.0%
Normal weight	22	8.9%
Overweight	63	25.4%
Class I obese	82	33.1%
Class II obese	45	18.1%
Class III obese	36	14.5%
Parity, n (%)		
Primiparous	179	72.2%
Multiparous	69	27.8%
Gestational age, n (%)		
Preterm	66	26.6%
Term	182	73.4%
Labour, n (%)		
Elective	60	24.2%
Emergency	188	75.8%
Hypertensive disorders, n (%)		
Yes	55	22.2%
No	193	77.8%
DM, n (%)		
Yes	86	34.7%
No	162	65.3%
Autoimmune disease, n (%)		
Yes	5	2.0%
No	243	98.0%

Table 2: Comparison of basic and obstetric characteristics between SSI group and control group

Variables	SSI Group (n=248)	Control group (n=23762)	P value
Age, n (%)			
<= 19 years	2 (0.8%)	138 (0.6%)	0.009
20 to 34 years	205 (82.7%)	21112 (88.8%)	
>= 35 years	41 (16.5%)	2512 (10.6%)	
BMI, n (%)			
Underweight	0 (0.0%)	486 (2.0%)	<0.001
Normal weight	22 (8.9%)	7568 (31.8%)	
Overweight	63 (25.4%)	9337 (39.3%)	
Class I obese	82 (33.1%)	4664 (19.6%)	
Class II obese	45 (18.1%)	1289 (5.4%)	
Class III obese	36 (14.5%)	418 (1.8%)	
Parity, n (%)			
Primiparous	179 (72.2%)	13047 (54.9%)	<0.001
Multiparous	69 (27.8%)	10715 (45.1%)	
Gestational age, n (%)			
Preterm	44 (17.7%)	4594 (19.3%)	0.528
Term	204 (82.3%)	19168 (80.7%)	
Labour, n (%)			
Elective	60 (24.2%)	13525 (56.9%)	< 0.001
Emergency	188 (75.8%)	10237 (43.1%)	
Hypertensive disorders, n (%)			
Yes	55 (22.2%)	4475 (18.8%)	0.180
No	193 (77.8%)	19287 (81.2%)	
DM, n (%)			
Yes	86 (34.7%)	7786 (32.8%)	0.524
No	162 (65.3%)	15976 (67.2%)	
Autoimmune disease, n (%)			
Yes	5 (2.0%)	407 (1.7%)	0.904
No	243 (98.0%)	23355 (98.3%)	
PROM/PPROM, n (%)			
Yes	60 (24.2%)	1371 (5.8%)	< 0.001
No	188 (75.8%)	22391 (94.2%)	
PPH, n (%)			
Yes	33 (13.3%)	1630 (6.9%)	< 0.001
No	215 (86.7%)	22132 (93.1%)	

Table 3: Logistic Regression to Assess the Risk Factors of SSI

Variables	Univariate analysis		Multivariable analysis	
	Crude odds ratio (95%CI)	P-value	Adjusted odds ratio (95%CI)	P-value
Age group				
>=35 years	(Ref)			
20 to 34 years	0.595 (0.424-0.834)	**0.003**	0.551 (0.385-0.789)	**0.001**
<=19 years	0.888 (0.213-3.709)	0.871	0.716 (0.165-3.112)	0.656
BMI				

Normal	(Ref)			
Underweight	-	0.966	-	0.965
Overweight	2.321 (1.427-3.775)	**0.001**	2.332 (1.432-3.799)	**0.001**
Class I obese	6.048 (3.772-9.696)	**<0.001**	6.548 (4.071-10.530)	**<0.001**
Class II obese	12.009 (7.188-20.065)	**<0.001**	14.061 (8.360-23.650)	**<0.001**
Class III obese	29.627 (17.274-50.812)	**<0.001**	37.349 (21.444-65.051)	**<0.001**
Parity				
Primiparous	(Ref)			
Multiparous	0.469 (0.355-0.62)	**<0.001**	0.812 (0.588-1.120)	0.204
Gestational age				
Term	(Ref)			
Preterm	0.9 (0.649-1.248)	0.528		
Labour				
Elective	(Ref)			
Emergency	4.14 (3.092-5.542)	<0.001	3.822 (2.735-5.340)	<0.001
Hypertensive disorders				
No	(Ref)			
Yes	1.228 (0.909-1.660)	0.181		
DM				
No	(Ref)			
Yes	1.089 (0.837-1.417)	0.524		
Autoimmune disease				
No	(Ref)			
Yes	1.181 (0.484-2.878)	0.715		
PPROM/PROM				
No	(Ref)			
Yes	5.212 (3.878-7.006)	<0.001	3.750 (2.731-5.149)	<0.001
PPH				
No	(Ref)			
Yes	2.084 (1.440-3.017)	<0.001	1.711 (1.167-2.508)	0.006

Table 4: Comparison of Basic and Obstetric Characteristics between Elective and Emergency

Variables	Elective(n=60)	Emergency (n=188)	P value
Age, n (%)			
<=19 years	0 (0.0%)	2 (1.1%)	0.527
20 to 34 years	48 (80.0%)	157 (83.5%)	
>=35 years	12 (20.0%)	29 (15.4%)	
BMI, n (%)			
Underweight	0 (0.0%)	0 (0.0%)	**0.034**
Normal weight	3 (5.0%)	19 (10.1%)	
Overweight	12 (20.0%)	51 (27.1%)	
Class I obese	19 (31.7%)	63 (33.5%)	
Class II obese	10 (16.7%)	35 (18.6%)	
Class III obese	16 (26.7%)	20 (10.6%)	

Hypertensive disorders, n (%)			
Yes	14 (23.3%)	41 (21.8%)	0.804
No	46 (76.7%)	147 (78.2%)	
DM, n (%)			
Yes	22 (36.7%)	64 (34.0%)	0.71
No	38 (63.3%)	124 (66.0%)	
Autoimmune disease, n (%)			
Yes	1 (1.7%)	4 (2.1%)	0.825
No	59 (98.3%)	184 (97.9%)	
PROM/PPROM, n (%)			
Yes	7 (11.7%)	53 (28.2%)	**0.009**
No	53 (88.3%)	135 (71.8%)	
PPH, n (%)			
Yes	7 (11.7%)	26 (13.8%)	0.668
No	53 (88.3%)	162 (86.2%)	
Parity, n (%)			
Primiparous	27 (45.0%)	152 (80.9%)	**<0.001**
Multiparous	33 (55.0%)	36 (19.1%)	
Gestational age, n (%)			
Preterm	6 (10.0%)	38 (20.2%)	0.071
Term	54 (90.0%)	150 (79.8%)	
Chorioamnionitis, n (%)			
Yes	0 (0.0%)	5 (2.7%)	0.202
No	60 (100.0%)	183 (97.3%)	
Intrapartum pyrexia, n (%)			
Yes	0 (0.0%)	16 (8.5%)	**0.019**
No	60 (100.0%)	172 (91.5%)	
Anemia, n (%)			
Yes	7 (11.7%)	25 (13.3%)	0.743
No	53 (88.3%)	163 (86.7%)	
Type of SSI, n (%)			
Deep	1 (1.7%)	1 (0.5%)	0.392
Superficial	59 (98.3%)	187 (99.5%)	
Singleton / Multifetal, n (%)			
Multifetal	4 (6.7%)	14 (7.4%)	0.805
Singleton	56 (93.3%)	174 (92.6)	
Induction of labour, n (%)			
Yes	8 (13.3%)	102 (54.3%)	**<0.001**
No	52 (86.7%)	86 (45.7%)	
Number of vaginal examinations after setting into labour, n (%)			
1 to 4	2 (3.3%)	81 (43.1%)	**<0.001**
>=5	0 (0.0%)	29 (15.4%)	
Not done	58 (96.7%)	70 (37.2%)	
Data not available	0 (0.0%)	8 (4.3%)	

Antibiotic prophylaxis, n(%)			
<30 mins	32 (53.3%)	93 (49.5%)	0.683
>=30 mins	27 (45.0%)	88 (46.8%)	
Date not available	1 (1.7%)	7 (3.7%)	
Duration of the surgery, n(%)			
<=45 mins	47 (78.3%)	135 (71.8%)	0.579
>45 mins	10 (16.7%)	43 (22.9%)	
Data not available	3 (5.0%)	10 (5.3%)	

Table 5: Distribution of Organisms Isolated in SSI Cases by Clinical Conditions

Type of organism	HTN (n=55)	DM (n=86)	Autoimmune disease (n=5)	PPROM/PROM (n=60)	PPH (n=33)
E. Coli	15 (27.3%)	21 (24.4%)	3 (60%)	16 (26.7%)	5 (15.2%)
Staphylococcus aureus	11 (20%)	16 (18.6%)	0 (0%)	6 (10%)	9 (27.3%)
Enterococcus faecalis	5 (9.1%)	10 (11.6%)	0 (0%)	15 (25%)	4 (12.1%)
Klebsiella pneumonia	7 (12.7%)	12 (14%)	0 (0%)	13 (21.7%)	8 (24.2%)
Klebsiella oxytoca	4 (7.3%)	5 (5.8%)	0 (0%)	3 (5%)	1 (3%)
Pseudomonas aeruginosa	4 (7.3%)	4 (4.7%)	1 (20%)	1 (1.7%)	2 (6.1%)
Proteus mirabilis	3 (5.5%)	5 (5.8%)	0 (0%)	0 (0%)	0 (0%)
Proteus vulgaris	0 (0%)	2 (2.3%)	0 (0%)	0 (0%)	0 (0%)
Acinetobacter	1 (1.8%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Enterobacter aerogenes	0 (0%)	1 (1.2%)	0 (0%)	0 (0%)	0 (0%)
Streptococcus spp	0 (0%)	1 (1.2%)	0 (0%)	1 (1.7%)	0 (0%)
No growth	8 (14.5%)	12 (14%)	1 (20%)	6 (10%)	5 (15.2%)

Table 6: Gram Negative Antibiogram for 5 years for LSCS Wound swabs

	n=	Amikacin	Gentamycin	Cefaperazone sulbactum	Piperacillin Tazobatum	Levofloxacin	Meropenem	Amoxyclav	Cefepime-IVth	Cefalexin-Ist	Cefazolin-Ist	Cefuroxime-IInd	Cefexime-IIIrd	Ceftazidime-IIIrd	Cefotaxim--IIIrd	Ceftazoxime-IIIrd
E coli	257	99	95	98	94	90	98	63	87	36	36	40	65	74	69	72
Klebsiella	125	98	97	100	99	99	100	45	87	28	28	38	69	70	66	70

Table 7: Gram Positive Antibiogram for 5 years for LSCS Wound swabs

	n	Vancomycin	Linezolid	Piperacillin Tazob atum	Levofloxacin	Ciprofloxacin	Amoxyclav	Amoxycillin	Ampicillin	Penicillin	Clindamycin	Erythromycin
Staphhylococcus aureus	87	-	100	100	98	73	100	100	-	100	98	83
Enterococcus faecalis	55	100	100	100	97	96	91	91	82	85	-	

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Author contributions: NP, SG, SAD, PCR, were involved in patient care and data collection. NP and PCR commented and edited the paper. NP and PCR were responsible for data analysis, the write up the first draft and revision of the paper. All authors checked, interpreted results and approved the final version.

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Urinary Tract Infections During Pregnancy: Prevalence, Risks and Treatment

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Abstract- The article discusses the high incidence and risks of urinary tract infections (UTIs) in pregnant women. Due to physiological and anatomical changes during pregnancy, such as the dilation of the urinary tract and compression of the ureters, the risk of UTIs increases significantly. UTIs can be asymptomatic, present as cystitis, or progress to pyelonephritis, each with its own complications and treatment needs. The main complications associated with UTIs in pregnancy include preterm birth, low birth weight, anemia, renal insufficiency, and systemic infection, affecting both the mother and the newborn. The article emphasizes the importance of early screening and treatment to prevent these complications, recommending urine culture tests at the beginning and throughout pregnancy. Treatment should be based on the efficacy and safety of antibiotics for the fetus, with penicillins and cephalosporins being the first-line medications.

Keywords: urinary tract infections; pregnancy; asymptomatic bacteriuria; cystitis; pyelonephritis; complications; risks; treatments.

GJMR-E Classification: NLM: WQ330, WQ450

Strictly as per the compliance and regulations of:

Urinary Tract Infections During Pregnancy: Prevalence, Risks and Treatment

Infecções do Trato Urinário na Gestação: Prevalência, Riscos eTratamento

Natalia Rincon Arruda Daguer Damasceno [α] & Lorena de Sousa Ciriaco [σ]

Resumo- O artigo discute a alta incidência e os riscos das infecções do trato urinário (ITUs) em gestantes. Devido às alterações fisiológicas e anatômicas durante a gravidez, como a dilatação do trato urinário e a compressão dos ureteres, o risco de ITUs aumenta significativamente. As ITUs podem ser assintomáticas, apresentar-se como cistite ou evoluir para pielonefrite, cada uma com suas próprias complicações e necessidades de tratamento. As principais complicações associadas às ITUs na gestação incluem parto prematuro, baixo peso ao nascer, anemia, insuficiência renal e infecção sistêmica, tanto para a mãe quanto para o recém-nascido. O artigo destaca a importância do rastreamento e tratamento precoce para prevenir essas complicações, recomendando exames de urocultura no início e durante a gestação. O tratamento deve ser baseado na eficácia e segurança dos antibióticos para o feto, sendo as penicilinas e cefalosporinas os medicamentos de primeira linha. A prevenção, rastreamento e tratamento adequado das ITUs são essenciais para reduzir os riscos de desfechos adversos na gravidez. Adicionalmente, é fundamental que novos estudos sejam realizados para aprofundar a compreensão da relação entre ITUs e as complicações para o feto, como baixo peso ao nascer e prematuridade, que ainda hoje não está completamente definida.

Palavras-chave: infecções do trato urinário; gestação; bacteriúria assintomática; cistite; pielonefrite; complicações; riscos; tratamento.

Abstract- The article discusses the high incidence and risks of urinary tract infections (UTIs) in pregnant women. Due to physiological and anatomical changes during pregnancy, such as the dilation of the urinary tract and compression of the ureters, the risk of UTIs increases significantly. UTIs can be asymptomatic, present as cystitis, or progress to pyelonephritis, each with its own complications and treatment needs. The main complications associated with UTIs in pregnancy include preterm birth, low birth weight, anemia, renal insufficiency, and systemic infection, affecting both the mother and the newborn. The article emphasizes the importance of early screening and treatment to prevent these complications, recommending urine culture tests at the beginning and throughout pregnancy. Treatment should be based on the efficacy and safety of antibiotics for the fetus, with penicillins and cephalosporins being the first-line medications. Prevention, screening, and adequate treatment of UTIs are essential to reduce the risks of adverse pregnancy outcomes. Additionally it is crucial that new studies be conducted to deepen the understanding of the relation between UTIs and complications for the fetus, such as low birth weight and prematurity, which are still not fully defined.

Keywords: urinary tract infections; pregnancy; asymptomatic bacteriuria; cystitis; pyelonephritis; complications; risks; treatments.

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I. Introdução

A infecção do trato urinário (ITU) é definida pela presença de bactérias no trato urinário, capazes de causar alterações morfológicas e/ou funcionais. Em gestantes, o risco de ITU aumenta devido a modificações fisiológicas e anatômicas (HERRAIZ et al., 2005). No início da gestação, altos níveis de progesterona promovem uma ação miorrelaxante, favorecendo a dilatação pielocalicinal e ureteral e a diminuição do peristaltismo no trato urinário. A partir da sétima semana, 90% das gestantes apresentam dilatação do trato urinário superior, com pico entre a 22ª e 24ª semana. Além disso, a compressão extrínseca dos ureteres pelo útero gravídico e a dilatação do plexo venoso ovárico contribuem para a hidronefrose fisiológica da gestação (SILVA et al., 2018). O esvaziamento incompleto da bexiga facilita o refluxo e a migração bacteriana ascendente (HERRAIZ et al., 2005).

A ITU em gestantes resulta da combinação de fatores predisponentes com a virulência dopatógeno. A infecção pode ocorrer via hematogênica, linfática ou ascendente, sendo esta última a principal. A uretra feminina, relativamente curta (3 a 4 cm), facilita a contaminação, especialmente por bactérias como Escherichia coli, que possuem fímbrias para aderência ao urotélio (SILVA et al., 2018). Estima-se que até 20% das mulheres grávidas sofram de ITU, com 10% necessitando de internação. ITUs são a segunda enfermidade mais comum em gestantes, após a anemia (SILVA et al., 2018).

A ITU na gestação pode ser classificada em: bacteriúria assintomática (BA), cistite (ITU baixa) e pielonefrite (ITU alta). A BA não apresenta sintomas clínicos e pode ser diagnosticada por exames de rastreamento no pré-natal, permitindo tratamento

precoce e evitando a progressão para pielonefrite (SILVA et al., 2018). A cistite causa sintomas como polaciúria, disúria, urgência miccional, hematúria e dor em baixo ventre. A pielonefrite, caracterizada pela inflamação no parênquima e pelve renal, apresenta bacteriúria significativa e manifestações sistêmicas como febre, lombalgia, náuseas, vômitos e prostração, além de sinal de Giordano positivo, podendo ou não se manifestar com os sintomas clássicos de cistite. Cistite e pielonefrite podem acometer entre 1% a 4% das gestantes (SILVA et al., 2018).

A urocultura é o exame padrão ouro para rastreamento e diagnóstico. Na ausência deste, o exame de urina de rotina com piúria e o teste do nitrito e leucócito-esterase positiva auxiliam no diagnóstico e permitem o tratamento empírico (FILHO; D'ABREU, 2021). A incidência de BA em gestantes é de 2% a 10%, e as complicações das ITUs incluem parto prematuro, amniorrexe prematura, baixo peso ao nascer, anemia, insuficiência renal, hipertensão arterial e infecção sistêmica materna e neonatal, justificando o rastreamento rotineiro no pré-natal com exames de EAS e urocultura no primeiro e terceiro trimestres (SILVA et al., 2018).

Dada a prevalência, riscos e complicações das ITUs na gestação, a prevenção, rastreamento e tratamento adequado são fundamentais para reduzir o risco de desfechos graves. Este estudo visa analisar as evidências científicas sobre a prevalência das ITUs na gestação, seus possíveis riscos para mãe e feto, e o tratamento recomendado para cada tipo de afecção (Bacteriúria Assintomática, Cistite e Pielonefrite). Objetivos específicos incluem identificar a população de risco para ITU na gestação, avaliar a eficácia do rastreamento para BA em gestantes e relacionar a ITU na gestação com a incidência de parto prematuro e baixo peso ao nascer.

II. Metodologia

Este estudo é uma revisão narrativa de literatura, cujo objetivo principal é analisar a prevalência, os riscos e o tratamento adequado da infecção urinária durante a gestação. A pesquisa foi realizada nas bases de dados UptoDate, MedLine, SCielo e Cochrane, além de livros de Medicina de Emergência e Ginecologia e Obstetrícia. Utilizou-se os descritores "urinary tract infection" e "pregnant woman".

Os critérios de inclusão foram: artigos e bibliografias relevantes ao tema, publicados entre 1995 e 2021, em inglês, português ou espanhol, com texto completo disponível em formato eletrônico e que apresentavam evidências e teorias sólidas sobre o assunto. Os critérios de exclusão foram: bibliografias desatualizadas ou inespecíficas, artigos incompletos, de baixa relevância científica ou com resultados tendenciosos.

Os trabalhos selecionados foram lidos na íntegra, analisados e criticamente revisados para compor o conteúdo deste estudo. Após aplicar os critérios de inclusão e exclusão, 16 artigos foram selecionados.

III. Revisão de Literatura

a) *Epidemiologia e Classificação das Infecções do Trato Urinário na Gestação*

Silva e colaboradores (2018) afirmam que a Infecção do Trato Urinário (ITU) é a principal forma de infecção durante a gravidez. Estas ocorrem entre 17% a 20% das gestações e pode levar a complicações, tais como a corioamnionite clínica e subclínica, parto prematuro e infecção neonatal; além de insuficiência respiratória, distúrbio eletrolíticos, insuficiência renal, choque séptico e morte, que constituem complicações maternas graves (VAZQUEZ, J.C; ABALOS, E., 2011).

De acordo com Szweda e Józwik (2016), as ITUs compõem a segunda doença mais comum da gestação, sendo a causa de aproximadamente 5% das internações hospitalares na prenhez. Nesse sentido, devido à alta morbimortalidade materna e neonatal, Malta e colaboradores (2014) preconizam que diagnóstico e tratamento precoces são essenciais para evitar desfechos adversos epossíveis complicações.

A ITU na gestação é classificada em três variações: Bacteriúria Assintomática (BA), Cistite e Pielonefrite. Millar e Cox (1997) em seu estudo, definem a BA como a colonização de bactérias de forma persistente no trato urinário, com ausência de sintomatologia clínica, e está presente em cerca de 10% das gestantes. Tem como fator de risco o baixo nível socioeconômico, traço falciforme e Diabetes Mellitus (DM), inclusive a DM gestacional (GILSTRAP, L. C.; RAMIN, S.M., 2001).

Caso não seja tratada, a BA evolui para pielonefrite aguda em aproximadamente 30% das mulheres grávidas. Neste cenário, Romero e colaboradores (1989) desenvolveram uma metanálise na qual demonstrou que gestantes sem bacteriúria apresentavam metade do risco de parto prematuro, em comparação com as gestantes que apresentaram BA não tratada durante a gravidez. Este estudo também constatou que mulheres sem bacteriúria na gravidez apresentaram um risco significativamente menor de terem um bebê com baixo peso ao nascer, quando comparado às gestantes com BA sem tratamento. Sendo assim, apesar de a relação entre a BA e a prematuridade e o baixo peso ao nascer seja um motivo de controvérsia atualmente, pode-se dizer que existe uma associação e, por esse motivo, as gestantes rastreadas com BA no início da gravidez devem ser tratadas com antibioticoterapia.

Conforme Glaser e Schaeffer (2015) citam em seu trabalho, é recomendado o rastreio para BA pela urocultura no início da gestação e outros, entre a 12ª e 16ª semanas. A urocultura continua sendo o método mais eficaz para rastreio de BA, mesmo com sua a demanda de tempo – uma vez que necessita de um período de 24 a 48 horas de análise – e o alto custo. Outros testes, como a urinálise e a tira reagente de urina não apresentam sensibilidade significativa para a bacteriúria (GLASER, A.; SCHAEFFER, A., 2015).

De acordo com Filho e colaboradores (2018) e Duarte e colaboradores (2008) a cistite apresenta-se com sintomas de infecção do trato urinário baixo, tais como disúria, polaciúria, hematúria e dor em baixo ventre e é definida pela colonização bacteriana na mucosa vesical. Atualmente, a cistite bacteriana apresenta o desconforto como única morbidade relacionada à gestação (MILLAR, L. K.; COX, S.M., 1997).

Já a pielonefrite, segundo Ángel Herráiz e colaboradores (2005), é a principal causa não obstétrica de internação em mulheres grávidas e deve ser considerada como uma complicação grave, uma vez que está estritamente associada ao choque séptico, trabalho de parto prematuro e retardo do crescimento intrauterino.

> "É mais comum no segundo (45-50%) e terceiro trimestres (40-45%) do que no primeiro (10%). O risco de recorrência durante a mesma gravidez é de 15%. Quase um terço das mulheres grávidas com PA terá infecções recorrentes e/ou anormalidades estruturais dos rins no futuro. Por esse motivo, é necessário realizar um acompanhamento com uroculturas semelhante à proposta para BA. Em Pielonefrite recorrente ou com complicações urológicas, as pacientes devem ser reavaliadas no pós-parto." (ÁNGEL HERRÁIZ, M. et al., 2005, p. 44).

De acordo com Glaser e Schaeffer (2015), os principais fatores de risco para pielonefrite na gestação são: presença de BA, nulíparas, episódios anteriores de pielonefrite, doença ou traço falciforme, diabetes, imunossuprimidas e com idade mais jovem.

b) Etiologia das Infecções do Trato Urinário na gravidez

Os uropatógenos mais comumente isolados na BA são similares àqueles encontrados na cistite e na pielonefrite, sendo a *Escherichia coli* o principal patógeno. Outros patógenos podem ser encontrados, como: *Enterobacter sp.*, *Proteus Klebsiella sp.*, *Pseudomonas sp.*, *Staphylococcus saprophyticus*, *Enterococcus faecalis* e *Streptococcus agalactiae* (grupo B) (FILHO; D'ABREU, 2021).

A maior incidência etiológica pela E. Coli pode ser explicada, segundo Ángel Herráiz e colaboradores (2005) pela menor produção de interleucina-6 pela gestante e consequente queda na resposta antigênica específica ao patógeno.

Filho e colaboradores (2021) afirmam que a *E. Coli* seja responsável por 75% a 90% dos casos. O mesmo trabalho também cita outros patógenos gram-negativos relacionados à ITU, tais como *Klebsiella pneumoniae, Proteus mirabilis, Enterococcus* e *Enterobacter;* além de gram-positivos, como o *Streptococcus agalactiae* ou estreptococo do grupo B, agente destacado pelo estudo de Allen e colaboradores (2012) por sua significância na prevalência de desfechos adversos, casonão tratada.

c) Tratamento

A revisão sistemática de Vazquez e Abalos (2011) reuniu diversos ensaios clínicos randomizados com o objetivo de determinar o tratamento mais efetivo para as ITUs na gestação. Segundo os autores, a escolha da antibioticoterapia deve se basear nos seguintes fatores: eficácia do medicamento, sua cobertura contra o patógeno, sua capacidade de manter níveis séricos e teciduais durante o período de tratamento, além de seu custo, tolerância e segurança para o feto. Neste estudo, os agentes microbianos listados foram:

- Penicilinas e ampicilinas;
- Cefalosporinas (cefazolina e ceftriaxona);
- Aminoglicosídeos (gentamicina);
- Antimetabólicos (trimetoprima e sulfametoxazol) e
- Outros (nitrofurantoína, fosfomicina e trometamol).

Glaser e Schaeffer (2015) também discorrem acerca da escolha do tratamento a ser utilizado, enfatizando a segurança do mesmo para a mãe e para o feto. Segundo os autores, deve-se levar em consideração que algumas alterações fisiológicas da gestação podem modificar a farmacocinética no que diz respeito à concentração sérica do fármaco no organismo, uma vez que há aumento do volume intra e extravascular. Além disso, é importante ressaltar também que grande parte dos antimicrobianos são capazes de transpassar a placenta, causando teratogenicidade.

Os autores separaram os antibióticos mais comumente utilizados nas ITUs durante a gestação e os classificaram conforme às categorias A, B, C, D e X da Food and Drugs Administration (FDA). Os medicamentos da categoria A foram estudados em estudos controlados em gestantes, não apresentando risco ao feto no primeiro trimestre de gestação. A categoria B inclui fármacos que foram testados em estudos com animais e não apresentaram riscos para estes, porém não foram feitos estudos em mulheres grávidas. A categoria C possui medicações que não possuem testes em animais, nem em humanos; ou que foram testadas em animais e apresentaram risco. Já os fármacos da categoria D demonstram evidência científica para risco fetal, todavia, seus benefícios podem justificar os riscos. Por fim, a categoria X

engloba drogas cuja evidência científica demonstra risco ao feto e não há qualquer benefício ao seu uso maior que o risco. Na tabela 1, estão listados os antibióticos que podem ser utilizados na gravidez:

Tabela 1: Antibióticos utilizados na gravidez

Droga	Categoria FDA	Comentários
Amoxicilina	B	
Cefalexina	B	Cefalosporina de 1ª geração
Cefuroxima	B	Cefalosporina de 2ª geração
Ceftriaxona	B	Cefalosporina de 3ª geração
Clindamicina	B	Comumente utilizada em casode alergia a penicilinas
Azitromicina	B	
Nitrofurantoína	B	Apenas para ITU baixa; risco de teratogenia controversa poranemia hemolítica em deficiência de G6PD no terceiro trimestre
Fosfomicina	B	Apenas para ITU baixa
Sulfadiazina	C	Evitar se houver outras
		opções
Vancomicina	B	Dados limitados
Gentamicina	C	Comumente utilizada na pielonefrite; potencial riscode nefrotoxicidade e ototoxicidade
Ciprofloxacino	C	Evitar na gestação
Tetraciclina	C	Evitar na gestação

Adaptado de: GLASER, Alexander P.; SCHAEFFER, Anthony J. Urinary tract infection and bacteriuria in pregnancy. Urologic Clinics, v. 42, n. 4, p. 547-560, 2015.

Em resumo, as penicilinas são utilizadas como tratamento de primeira linha para infecções por Estreptococos do grupo B (EGB); para pielonefrite, usam-se as cefalosporinas; para infecções do trato urinário baixo, o medicamento mais utilizado é a nitrofurantoína; e aminoglicosídeos (gentamicina) em associação com ampicilina para tratamento de pielonefrite por bacilos negativos (GLASER, A.; SCHAEFFER, A., 2015).

A Tabela 2 a seguir demonstra resumidamente a incidência, diagnóstico e tratamento para as 3 classificações de ITU na gestação.

Tabela 2: Incidência, diagnóstico, tratamento recomendado e acompanhamento de BA,Cistite e Pielonefrite

	Incidência (%)	Diagnóstico	Duração do tratamento(dias)	Acompanhamento
Bacteriúria Assintomática	2-10	Sem sintomas; Bacteriúria confirmada na urocultura.	3-7	Triagem periódicapara bacteriúria recorrente; Considerar antibioticoterapiaprofilática.
Cistite	1-2	Disúria; Urgência	3-7	Triagem periódicapara bacteriúria recorrente;
		miccional; Polaciúria; Hematúria; Desconforto suprapúbico; Bacteriúria.		Considerar antibioticoterapiaprofilática.
Pielonefrite	1	Febre; Calafrios; Dor nos flancos; Náuseas evômitos; Bacteriúria.	7-14	Triagem periódicapara bacteriúria recorrente; Considerarfortemente antibioticoterapiaprofilática.

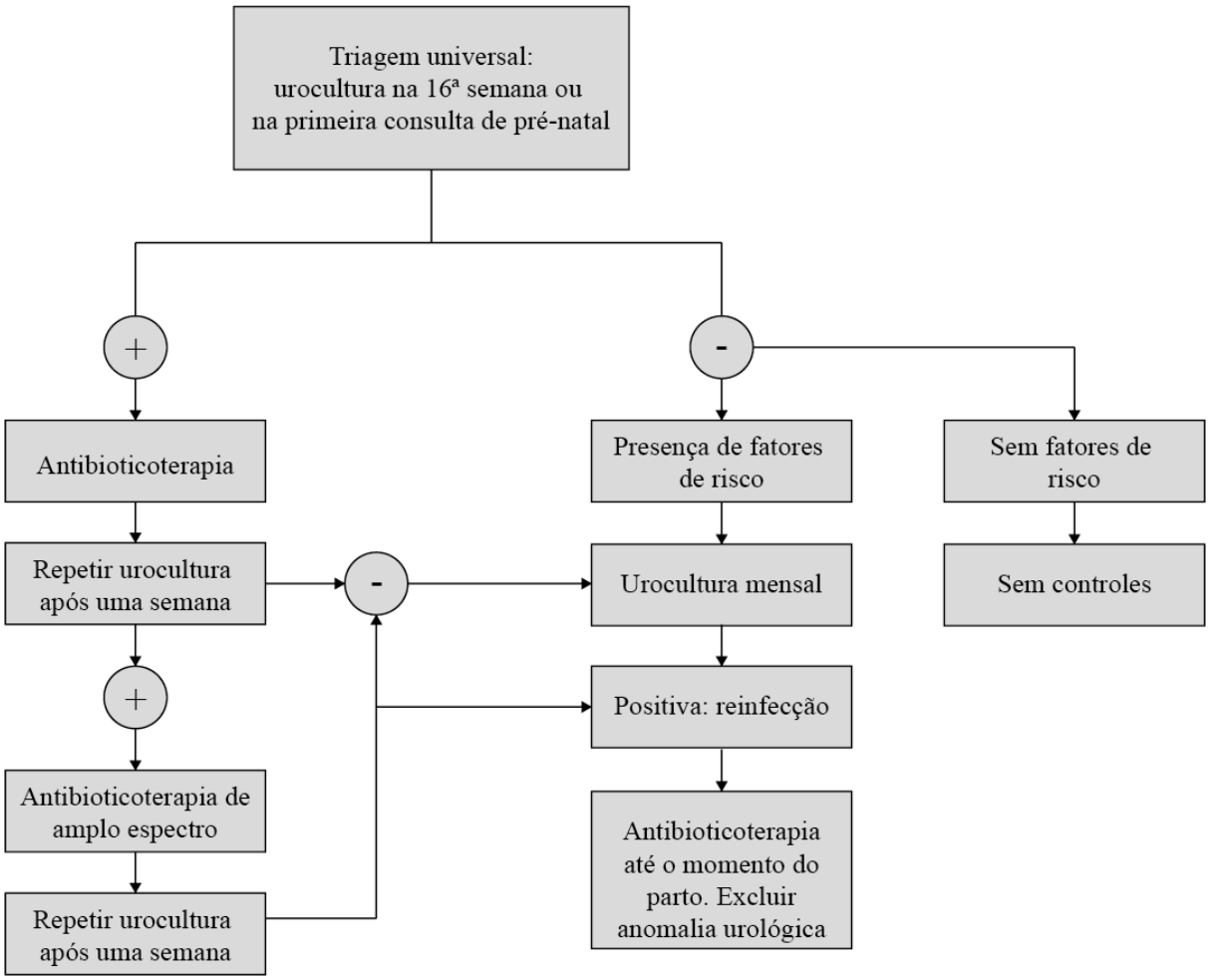
Adaptado de: GLASER, Alexander P.; SCHAEFFER, Anthony J. Urinary tract infection and bacteriuria in pregnancy. Urologic Clinics, v. 42, n. 4, p. 547-560, 2015.

i. *Bacteriúria Assintomática*

O tratamento da BA, de acordo com Filho e colaboradores (2021), deve ser ambulatorial por um período de 7 a 10 dias, seguido de uma posterior urocultura de controle, feita 7 dias após o término do tratamento. Já Silva e colaboradores (2018) preconizam o tratamento de curta duração, de 3 a 7 dias. Segundo os autores, a antibioticoterapia escolhida deve ser guiada pela sensibilidade apresentada na urocultura.

A *Infectious Diseases Society of America* (IDSA) recomenda que o tratamento para BA deve ser feito com fosfomicina em dose de 3g, via oral, por 3 a 7 dias (GLASER, A.; SCHAEFFER, A., 2015). Pode-se instituir também uma terapia profilática com 50 a 100 mg de nitrofurantoína diária, visto que cerca de um terço das pacientes tratadas para BA poderão desenvolver bacteriúria recorrente – mesma cepa com contagem significativa de colônias cultivadas dentro de 2 semanas após a conclusão do tratamento inicial – ou reinfecção – mesma ou diferente cepa comcontagem significativa de colônias por mais de 2 semanas após a conclusão do tratamento – , incluindo EGB, devem ser tratadas novamente com antibióticos sensíveis à cepa identificada (ALLEN, V. M. et al., 2012).

De acordo com Ángel Herráiz e colaboradores (2005), o tratamento da BA reduz a incidência de infecção sintomática em 80-90% dos casos, mas, em contrapartida, a probabilidade de recorrência após o tratamento é alta – até 30%. Neste cenário, recomenda-se a urocultura de gestantes diagnosticadas com BA uma semana após o tratamento – conforme descrito no fluxograma abaixo:



Adaptado de: ÁNGEL HERRÁIZ, M. et al. Infección del tracto urinario en la embarazada. Enfermedades Infecciosas y Microbiología Clínica, v. 23, p. 43, dez. 2005.

Figura 1: Fluxograma da Bacteriúria Assintomática

ii. *Cistite*

O tratamento empírico da cistite deve levar em consideração os dados microbiológicos anteriores da paciente e a segurança dos antimicrobianos na gestação. Segundo o Ministério da Saúde (apudSilva et al., 2018), para cistites não complicadas, as escolhas são: nitrofurantoína 100 mg, de 4 vezes ao dia, por 7 a 10 dias – com o cuidado de evitar após a 36ª semana

de gestação –; cefalexina 500 mg, no mesmo esquema; ou amoxicilina associada a clavulanato 500 mg, 3 vezes ao dia, também por 7 a 10 dias.

iii. *Pielonefrite*

Há uma discussão acerca do regime de tratamento para pacientes gestantes com pielonefrite. Para Glaser e Schaeffer (2015), o tratamento deve ser hospitalar e o antimicrobiano deve ser administrado via endovenosa.

A maioria dos autores afirmam que o regime de tratamento ideal para a pielonefrite em gestantes é hospitalar. Todavia, pelo alto custo, algumas pacientes podem ser eleitas ao regime ambulatorial e, segundo Gilstrap e Ramin (2001), estas devem preencher os seguintes critérios:

- Se possível, permanecer em observação por 23 horas;
- Ter tolerância aos medicamentos orais;
- Não apresentar sinais ou sintomas de choque séptico, nem de disfunção orgânica;
- Ter disponibilidade de acompanhamento domiciliar.

As pacientes que necessitarem de hospitalização, por outro lado, devem receber hidratação parenteral concomitante à antibioticoterapia, além da monitorização dos sinais vitais e do débito urinário.

Silva e colaboradores (2018) e Filho e colaboradores (2021) afirmam que, por ser potencialmente grave, a pielonefrite deve ser tratada no ambiente intra hospitalar. Como um dos riscos é a infecção sistêmica e o choque séptico, é mandatório que os dados vitais da paciente sejam monitorados, além da verificação de necessidade de hidratação venosa e sintomáticos, como analgésicos e antieméticos. A terapia empírica deve ser iniciada precocemente, via endovenosa (EV), e alterada para via oral (VO), caso a gestante não apresente febre por no mínimo 48 horas. As drogas de escolha são: ampicilina e gentamicina, cefazolina, ambas EV; ou ceftriaxona, EV ouintramuscular (IM).

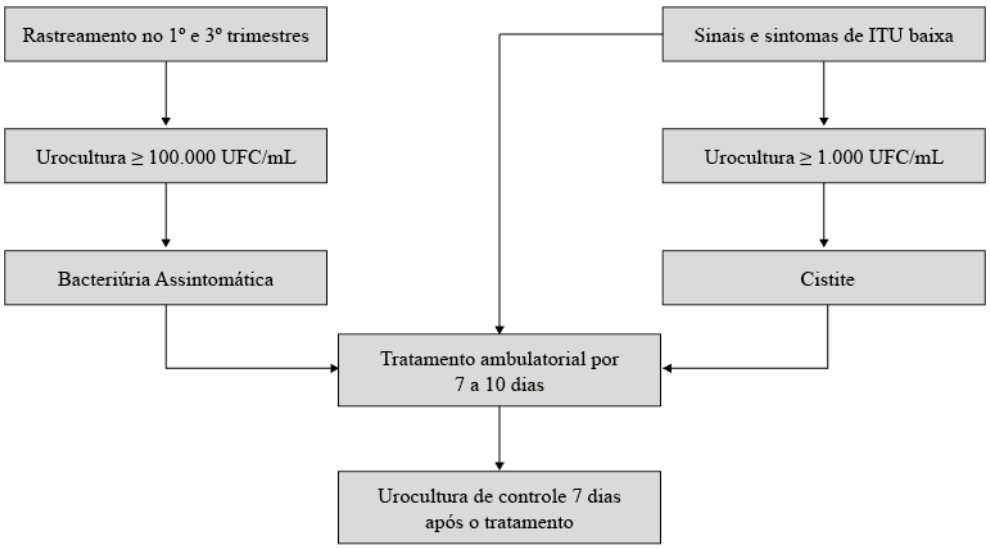
Caso a paciente não apresente cessação dos sintomas em 72 horas após início do tratamento empírico, deve-se considerar adicionar gentamicina ao esquema terapêutico, na dose de 3 a 5 mg/kg/dia, na justificativa de suspeita de patógeno resistente. Neste cenário, também é necessário investigar outros diagnósticos como a nefrolitíase e abscesso renal (GLASER, A.; SCHAEFFER,A., 2015).

Segundo Millar e Cox (1997), a disfunção renal, classificada com um clearance decreatinina menor que 80 mL/min, pode ocorrer em 25% das gestantes com pielonefrite e a tendência é que seja normalizada em poucos dias. Todavia, a administração de fluidos e a obtenção seriada de níveis séricos de creatinina devem ser feitos para acompanhamento e é importante se atentar ao tratamento com antibióticos que apresentem nefrotoxicidade nessas pacientes.

iv. *Fluxogramas para ITU baixa e ITU alta*

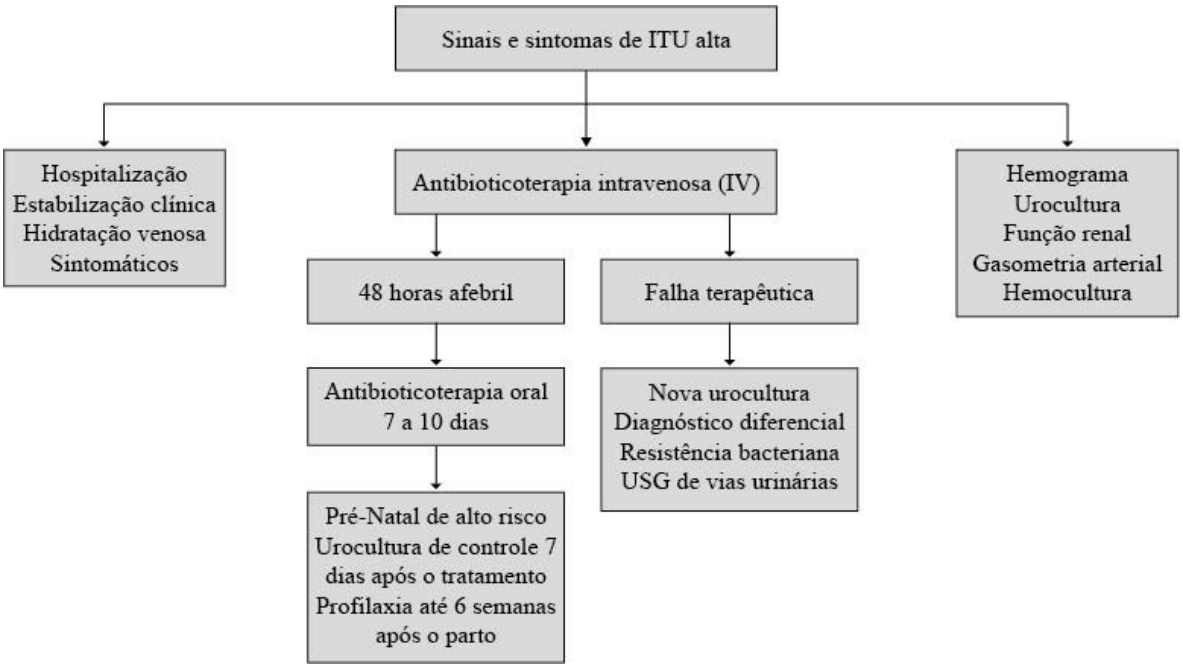
Filho e colaboradores (2021) organizaram a conduta de tratamento para as ITUs na gestação de acordo com o seu acometimento baixo (Bacteriúria Assintomática e Cistite) e alto (Pielonefrite).

Figura 2: Fluxograma de Infecções do Trato Urinário Baixo (BA e Cistite)



Adaptado de: FILHO, Agnaldo Lopes da S.; D'ABREU, Bárbara F. Protocolos e condutas em ginecologia e obstetrícia. Rio de Janeiro: MedBook Editora, 2021. E-book. ISBN 9786557830789

Figura 3: Fluxograma de Infecções do Trato Urinário Alto (Pielonefrite)



Adaptado de: FILHO, Agnaldo Lopes da S.; D'ABREU, Bárbara F. Protocolos e condutas em ginecologia e obstetrícia. Rio de Janeiro: MedBook Editora, 2021. E-book. ISBN 9786557830789.

v. *Resumo* do tratamento para BA, Cistite e Pielonefrite

A fim de sintetizar o que foi visto acerca do tratamento da ITU em gestantes no presente trabalho,a Tabela 5 abaixo apresenta os fármacos e os regimes de tratamento, de acordo com os autores analisados.

Tabela 5: Comparativo entre a escolha das terapias medicamentosas indicadas ao tratamento dasITUs ocorridas na gestação, pelos diferentes autores

Autor	Tipo de Infecção	Terapia Medicamentosa
Vazquez e Abalos (2011)	Pielonefrite	• Charleston, 1996: Antibióticos intravenosos +nitrofurantoína; • Flórida, 1995: Ceftriaxona ou cefazolina; • Los Angeles, 1998: Ceftriaxona IM OU ampicilina-gentamicina IV OU cefazolina IV.
Glaser e Schaeffer (2015)	Bacteriúria Assintomática	Penicilinas (Penicilina G, Amoxicilina, Ampicilina) – 3a 7 dias.
	ITU baixa (Cistite)	Nitrofurantoína e Aminoglicosídeos (gentamicina) – 3 a7 dias.
	Pielonefrite	Nitrofurantoína e Aminoglicosídeos (gentamicina) associada a Ampicilina (se bacilos negativos) – 7 a 14 dias.
Millar e Cox(1997)	Bacteriúria Assintomática	Nitrofurantoína, sulfisoxazole ou cefalexina – 3 a 7 diasou Nitrofurantoína, sulfisoxazole, cefalexina ouamoxicilina – dose única.
	ITU baixa (Cistite)	Nitrofurantoína, sulfisoxazole ou cefalexina – 3 a 7 diasou Nitrofurantoína, sulfisoxazole, cefalexina ouamoxicilina – dose única.
	Pielonefrite	Ampicilina IV + gentamicina IV;Cefazolina IV; Ceftriaxona IV;Mezlocilina IV;Piperacilina IV.
Gilstrap e Ramin (2001)	Pielonefrite	Cefalosporina ou ampicilina de primeira geração +gentamicina.
Herraiz (2005)	Bacteriúria Assintomática	Fosfomicina Trometamol – dose única.
	ITU baixa (Cistite)	Fosfomicina Trometamol – dose única.
	Pielonefrite	Amoxicilina/Ácido Clavulânico – 14 dias;Ceftriaxona – 14 dias; Cefuroxima Axetil – 14 dias. Se alergia à beta lactâmicos:Fosfomicina – 14 dias; Gentamicina ou Tobramicina – 14 dias;Aztreonam – 14 dias.

FEBRASGO - Tratado deObstetrícia (2019)	Bacteriúria Assintomática	Nitrofurantoína – 5 a 7 dias; Amoxicilina – 3 a 7 dias; Amoxicilina e Clavulanato – 3 a 7 dias;Cefalexina – 3 a 7 dias; Fosfomicina – 3 a 7 dias.
	ITU baixa (Cistite)	Nitrofurantoína – 5 a 7 dias; Amoxicilina – 3 a 7 dias; Amoxicilina e Clavulanato – 3 a 7 dias;Cefalexina – 3 a 7 dias; Fosfomicina – 3 a 7 dias.
	Pielonefrite	Ceftriaxona; Cefepime; Ampicilina e Gentamicina.
Filho e D'Abreu (2021)	ITU na gestação	Antibioticoterapia oral: • Amoxicilina – 7 a 10 dias; • Amoxicilina + clavulanato – 7 a 10 dias; • Ampicilina – 7 a 10 dias; • Cefalexina – 7 a 10 dias; • Nitrofurantoína – 7 a 10 dias; • Fosfomicina – dose única. Antibioticoterapia IV: • Amoxicilina + clavulanato – 8/8h; • Ceftriaxona – 24/24h; • Cefazolina – 8/8h; • Ampicilina – 6/6h; • Gentamicina – 24/24h.
Silva, Osonan,Bonomi (2018)	Bacteriúria Assintomática	Antibioticoterapia Oral: • Nitrofurantoína - 7 a 10 dias; • Cefalexina - 7 a 10 dias; • Amoxicilina + clavulanato - 7 a 10 dias.
	ITU baixa (Cistite)	Antibioticoterapia Oral: • Nitrofurantoína - 7 a 10 dias; • Cefalexina - 7 a 10 dias; • Amoxicilina + clavulanato - 7 a 10 dias.
	Pielonefrite	• Ampicilina + gentamicina EV – 24/24h; • Cefazolina endovenosa ou ceftriaxona endovenosa ou intramuscular.

vi. *Tratamento profilático em caso de recorrência*

Para a prevenção de ocorrência de ITU em gestantes, tem-se medidas farmacológicas e não farmacológicas. As farmacológicas consistem em antibioticoterapia profilática em mulheres com ITU recorrente, guiada pelo patógeno encontrado na última urocultura. Já para as medidas não farmacológicas, alguns estudos sugerem a suplementação de vitamina C para a população com alta recorrência de ITU e estudos com pouca evidência científica recomendam o uso de soluções em pó de *cranberry* (SILVA *et al*., 2018).

A profilaxia com antimicrobianos, de acordo com Filho e colaboradores (2021) deve ser ponderada para as mulheres grávidas com dois episódios de cistite ou um episódio de pielonefrite. Para estes casos, conforme relata Filho e colaboradores (2021), recomenda-se o uso de nitrofurantoína 100 mg por dia e cefalexina 500 mg por dia por um período de 6 semanas apósa concepção.

Conforme exposto, tanto o tratamento, quanto a profilaxia destinada às ITU na gestação são de suma importância para se evitar as possíveis complicações, advindas principalmente da pielonefrite, que são: "trabalho de parto prematuro e amniorrexe prematura, baixo peso ao nascer, anemia, insuficiência renal, hipertensão arterial e infecção sistêmica, tanto materna como neonatal" (SILVA et al., 2018). Vale ressaltar que, embora esta forma de acometimento seja a mais grave, qualquer que seja o diagnóstico inicial (BA ou cistite), deve-se tratar corretamente, com o intuito de evitar uma evolução para pielonefrite e, consequentemente, aumentar os riscos de complicações.

vii. *Complicações*

Conforme cita Gilstrap e Ramin (2001), cerca de 66% das gestantes com pielonefrite apresentaram anemia - definida com um hematócrito menor que 30%. A causa mais provável dessa complicação, segundo os

autores, é a hemólise secundária à endotoxina bacteriana.

Ángel Herráiz e colaboradores sintetizaram as principais complicações advindas da pielonefrite na gestação, listadas na Tabela 6.

Tabela 6: Complicações da Pielonefrite Aguda

Complicação	Frequência (%)	Considerações
Anemia hemolítica	25-30	Secundária a hemólise porendotoxinas; Hematócrito < 30% em dois terços dos casos.
Septicemia	15	Evolução para choqueséptico: 1-2%
Disfunção renal transitória	15-20	Creatinina < 80 mL/min Espera-se recuperação em algumas semanas com antibioticoterapia adequada.
Desconforto respiratórioagudo	5	Solicitar radiografia de tórax e gasometria arterial; 10-15% requerem ventilaçãomecânica.
Urinárias: • Abscesso perirenal; • Pielonefrite enfisematosa; • Litíase coraliforme.	< 5	Suspeitar se não houver resposta ao tratamento esolicitar ecografia renal.

Adaptado de: ÁNGEL HERRÁIZ, M. et al. Infección del tracto urinario en la embarazada. Enfermedades Infecciosas y Microbiología Clínica, v. 23, p. 40–46, dez. 2005.

Segundo Gilstrap e Ramin (2001), cerca de 15% dos bebês de mães que apresentaram pielonefrite na gestação tiveram peso ao nascer inferior a 2,5 kg.

> "Diversos patógenos que causam ITU produzem fosfolipase A2, o que culmina com a formação de prostaglandinas, como as prostaglandinas E2 e F2-alfa, que desencadeiam trabalho de parto prematuro e também podem ser a causa da rotura prematura de membranas. Esses mecanismos inflamatórios também são o motivo desse tipo de infecção aumentar em até 50% o risco de pré-eclâmpsia. O baixo peso ao nascer pode ser consequência do nascimento prematuro, mas também pode ser decorrente da infecção propriamente dita mesmo nos fetos nascidos a termo" (SILVA et al, 2018, p. 182).

Todavia, a associação de pielonefrite com o risco de parto prematuro e baixo peso ao nascer é controverso em todos os trabalhos analisados, uma vez que há um estímulo da atividade uterina com o uso de antibióticos na pielonefrite (GILSTRAP, L. C.; RAMIN, S. M., 2001).

IV. Considerações Finais

Tendo em vista que a ITU é uma das causas mais frequentes de internação das gestantes, torna-se essencial a reflexão acerca da prevalência, riscos e tratamento destas condições, além de realizar uma análise comparativa das diferentes condutas adotadas ao longo do tempo.

Diante do exposto, sabe-se que a realização de um exame físico de alta qualidade somado à urinálise são condutas padrão ouro para realizar o diagnóstico. A identificação do patógeno se torna essencial no que se diz respeito ao direcionamento do tratamento, visto que fatores como a eficácia do medicamento, sua cobertura contra o patógeno, sua capacidade de manter níveis séricos e teciduais durante o período de tratamento, além de seu custo, tolerância e segurança para o feto devem ser considerados no momento da escolha da terapia medicamentosa.

Visando atingir a realidade do SUS, a Federação Brasileira de Ginecologia e Obstetrícia (FEBRASGO) preconiza a utilização de Nitrofurantoína, Amoxicilina, Clavulanato, Cefalexina e Fosfomicina para o tratamento de Bacteriúria Assintomática e Cistite. No que se diz respeito à Pielonefrite, recomenda-se o uso de Ceftriaxona, Cefepime, Ampicilina e Gentamicina - terapias das quais mostraram-se eficazes na prevenção de complicações e morte. Sabe-se que, em diferentes países, as prescrições medicamentosas podem variar.

Por fim, a realização de ensaios clínicos com maior amostra possível de pacientes nos mais diversos países são indispensáveis para melhor nível de evidência sobre o tema, além de sua correlação com

possíveis riscos, tais como prematuridade e baixo peso ao nascer, haja vista que ainda hoje é controverso.

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Carboprost Versus Oxytocin in Active Management of Third Stage of Labour: Comparative Study

By Thakur NK, Shrestha B, Yadav BK, Aryal A & Shah C

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Abstract- *Background:* Worldwide every one minute one woman dies from pregnancy or child birth related complications. This study attempt to compare efficacy of Carboprost versus Oxytocin for active management of third stage of labour.

Methodology: Three hundred obstetric cases anticipated for spontaneous vaginal delivery were randomly divided into two groups. Out of which 150 received Intramuscular oxytocin 10 units and 150 cases received Intramuscular Carboprost 125 µg after the delivery of the baby.

The main outcome measured with respect to outcome of third stage of labor were: duration, blood loss by volume, difference in hemoglobin, need for additional oxytocics and side effects.

Keywords: *oxytocin, carboprost and third stage of labour.*

GJMR-E Classification: *LCC: RG133.5*

Strictly as per the compliance and regulations of:

Carboprost Versus Oxytocin in Active Management of Third Stage of Labour: Comparative Study

Thakur NK [α], Shrestha B [σ], Yadav BK [ρ], Aryal A [ω] & Shah C [¥]

Abstract- Background: Worldwide every one minute one woman dies from pregnancy or child birth related complications. This study attempt to compare efficacy of Carboprost versus Oxytocin for active management of third stage of labour.

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The main outcome measured with respect to outcome of third stage of labor were: duration, blood loss by volume, difference in hemoglobin, need for additional oxytocics and side effects.

Results: Carboprost group had shown significant reduction in duration of third stage of labour ($p<0.001$), blood loss ($p<0.001$) and reduction in hemoglobin was also less when compared to oxytocin. Most of oxytocin group side effects like nausea and vomiting (6%) while diarrhea (12%) was common among carboprost group.

Conclusion: The study concludes that intramuscular carboprost 125 µg is more effective in active management of third stage of labour. However, a large metacentric randomized controlled trial is required to draw conclusion.

Keywords: oxytocin, carboprost and third stage of labour.

I. Background

Third stage of labour is the period from the delivery of the baby until the delivery of the placenta(1). Active management of third stage of labour involves; routine administration of a prophylactic uterotonic drug just before, with, or immediately after, the birth of the baby; early cord clamping and controlled cord traction to deliver the placenta(2). According to WHO the most common complication of third stage of labour is Postpartum hemorrhage (PPH) which is defined as a blood loss of at least 500ml after vaginal delivery and 1000ml after cesarean section and/or necessity of postpartum blood transfusion within 24hours of delivery(3,4).

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Drugs conventionally used for prophylaxis against PPH includes oxytocin, methylergotmetrin, carboprost and syntometrin(5). Among them Oxytocin acts through receptor and voltage mediated calcium channels to initiate myometrial contractions. It is on the World Health Organization's List of Essential Medicines, the most effective and safe medicines needed in a health system (6). In other hand Carboprost It shortens induction to delivery interval. Carboprost being a prostaglandin promotes myometrium contraction irrespective of the duration of gestation, whereas oxytocin acts predominantly on the uterus at term or in labour.

The present study is an attempt to evaluate the scope of using carboprost tromethamine 125 µg which is half the therapeutic dose for PPH and to evaluate its efficacy in terms of amount of blood loss, duration of third stage, side effects in comparison with oxytocin 10 units in active management of third stage of labor.

II. Methodology

This study was a hospital based comparative study, conducted at National Medical College and Teaching

Hospital, Birgunj, Nepal which is a tertiary level hospital. The study period was twelve months from 16th July 2018 to 15th June, 2019. Ethical clearance was taken from institutional Review board (IRB) of National Medical College. Convenient Sampling method was used for sampling.

This study includes 300 women with singleton pregnancy with cephalic presentation in labor at term (3742 weeks of gestation). Excluding the women who underwent caesarean section, hypersensitivity to drugs, underlying comorbidity like respiratory diseases (asthma), cardiac disease, renal, liver disorder, epilepsy, psychiatry disorder, preeclampsia and eclampsia, severe anemia, multiple pregnancy, Polyhydramnios/ Oligohydramnios, Past History of PPH, Grand Multipara. These women are recruited in two group after taking informed consent with standardized form after admission in labor ward. Women who were likely to have vaginal delivery were offered entry to the trial with computer generated random numbers, to either control group to receive intramuscular oxytocin 10 units (group

A) or to the study group to receive intramuscular carboprost 125μg(group B) just after the delivery of the baby. A sterile tub is immediately placed at the vulva after delivery of fetus and blood volume was measured by measuring jar. Differences in the weight of drapes and sanitary pads was also estimated by weighing it before and after delivery and converting it into grams per milliliter. It is done by dividing difference in weight of drapes along with sanitary pads with density of blood (i.e 1gm/ml)(7).Estimated total blood loss was calculated by adding the 2 values. If intravenous oxytocin infusion was used during the second stage of labour, it was stopped immediately after delivery. The drape was removed 10 minutes after the episiotomy or laceration repair unless the patient continued to have significant PPH. Patients were further monitored for 1 hours postpartum for PPH and side effects of drugs.

III. Data Analysis and Statistical Analysis

The data collected were entered daily in the master chart. Pre-test of data was done after completing 10 cases and necessary adjustment were made after discussing with the guide. Regular meetings with guide were held to clear up any confusion. Analysis of the data was done. Data were summarized as mean and proportion with the help of the statistician and the final analysis was done using independent t test to test the difference between the 2 different groups. Paired data were analyzed using paired t test. Chi-square test was used to analyze the difference in proportions, and p values were reported accordingly. These findings were then presented in the form of tables, graphs and diagrams. P value was considered significant if $p < 0.05$. SPSS version 21 was the software used for calculation and tabulation of data.

IV. Result

The study population included 300 obstetric cases fulfilling inclusion and exclusion criteria. Out of which 150 received Intramuscular oxytocin 10 units and 150 cases received Intramuscular Carboprost 125μg just after the delivery. The age group ranged between 15-42 years. The mean age group of oxytocin group was 22.85±3.34 years and that of carboprost group was 25.29±4.07 years.101 and 131 women belongs to age group 21-35 years among oxytocin and carboprost groups respectively.

Duration of third stage of labour in oxytocin group ranges from 4-12 minutes and mean duration was 5.57±1.20454. In Carboprost group, the duration ranges from 4-11 minutes with mean duration of 4.85±0.84 .The difference in mean duration of third stage between two groups was 0.72. Intergroup comparison of both study groups showed p value of <0.001 which is statistically significant.

There was reduction of hemoglobin in both the groups. In oxytocin group difference in hemoglobin was 1.49 gm/dl while in carboprost group was 0.78gm/dl.

Comparison of Blood Loss in Study Groups

Blood loss range(ml)	Oxytocin n(%)	Carboprost n(%)
<100	0(0.00%)	41(27.33%)
101-150	0(0.00%)	31(20.66%)
151-200	29(19.33%)	53(35.33%)
201-250	37(24.66%)	18(12%)
251-300	49(32.66%)	2(1.33%)
301-350	31(20.66%)	2(1.33%)
351-400	2(1.33%)	0(0.00%)
401-500	0(0.00%)	1(0.66%)
>500	2(1.33%)	2(1.33%)

The above table shows distribution of both the groups according to amount of blood loss. The postpartum blood loss was less in carboprost group compared to oxytocin group which was statistically significant (p value<0.001) and 2 cases went into PPH in Both groups.

Comparison of Estimated Total Blood Loss

Groups	Total Blood Loss(ml)	
Oxytocin	269±61.83	P<0.001
Carboprost	156±80.01	

The above table shows comparison of blood loss between two groups. The blood loss in Oxytocin group was 269±61.83 compared to carboprost group which was 156±80.01 with p value of 0. 001. Intergroup comparison showed that the mean difference in estimated total blood loss between study groups was 113 with p value of 0.001 which was statistically significant.

In oxytocin group 26 0ut of 150 i.e. 17.3% required additional uterotonics whereas in carboprost group 9 out of 150 i.e. 6.0% required additional uterotonics. The difference in usage of additional uterotonics was statistically significant (p=0.002).

Women in oxytocin group had side effects like nausea and vomiting (6%), shivering (3.33%) and retained placenta (0.66%) while carboprost group had side effects like nausea and vomiting (7.3%), diarrhea (12%) and retained placenta (1.33%).

V. Discussion

This study was conducted in department of obstetrics and gynecology, at National medical college and teaching hospital to evaluate the two uterotonics for management of third stage of labor. 300 women were selected who fulfilled the selection criteria and they were divided in group A and group B 150 of each by computer generated random numbers. In this study we evaluated the efficacy of oxytocin 10 units (group A) with Carboprost 125μg (group B) in the third stage of labour and also recorded duration and blood loss in third stage of labour along with side effects and need for additional uterotonics.

Postpartum hemorrhage has been considered one of the most dreadful cause of maternal mortality worldwide with uterine atony being most common cause (70-90%). Active management of third stage of labour and prophylactic use of oxytocics after the delivery of baby has reduced its incidence by 40% (8,9). Main aim is to prevent PPH.

While it is clear that the use of prophylactic uterotonics will substantially reduce PPH , the most cost effective and ideal uterotonics has not been found, although intramuscular oxytocin is recommended by WHO .Methyl ergometrine is a conventional oxytocics used extensively but with hypertension as side effect. Intramuscular oxytocin has been found effective in preventing PPH even when used alone with fewer side effects. Oxytocin is probably the most commonly used oxytocic but is not the most potent drug and additional dosage or additional drugs may be needed at times with more blood loss compared to other oxytocics(10).

Carboprost is a strong uterotonic agent with a physiological role in human parturition both in the delivery and control of PPH. The discovery of prostaglandins and its analogues as an oxytocics has improved prospect in modern era in control of PPH due to its significant influence on uterine tone resulting in less blood loss that outweighs its cost. The side effects are also subtle(11,12).

VI. Conclusion

In our conclusion, our study favors that intramuscular carboprost 125μg is a better and cost-effective option compared to intramuscular oxytocin 10U and more effective in AMTSL. Carboprost minimized blood loss significantly with less need for additional uterotonics and effectively shortened the duration of third stage of labor compared to oxytocin. The result of our study demonstrated that prophylactic dose of carboprost is well tolerated and may be considered in all woman at risk of PPH. However, a large multicentric randomized controlled trial is required to draw conclusion.

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Certificate, LoR and Momento **2** discounted publishing/year **Gradation** of Research **10** research contacts/day **1 GB** Cloud Storage **GJ** Community Access	**Certificate,** LoR and Momento **Unlimited** discounted publishing/year **Gradation** of Research **Unlimited** research contacts/day **5 GB** Cloud Storage **Online Presense** Assistance **GJ** Community Access	**Certificates,** LoRs and Momentos **Unlimited** free publishing/year **Gradation** of Research **Unlimited** research contacts/day **Unlimited** Cloud Storage **Online Presense** Assistance **GJ** Community Access	**GJ** Community Access

Preferred Author Guidelines

We accept the manuscript submissions in any standard (generic) format.

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template

Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at submit@globaljournals.org or get in touch with chiefeditor@globaljournals.org if they wish to send the abstract before submission.

Before and during Submission

Authors must ensure the information provided during the submission of a paper is authentic. Please go through the following checklist before submitting:

1. Authors must go through the complete author guideline and understand and *agree to Global Journals' ethics and code of conduct,* along with author responsibilities.
2. Authors must accept the privacy policy, terms, and conditions of Global Journals.
3. Ensure corresponding author's email address and postal address are accurate and reachable.
4. Manuscript to be submitted must include keywords, an abstract, a paper title, co-author(s') names and details (email address, name, phone number, and institution), figures and illustrations in vector format including appropriate captions, tables, including titles and footnotes, a conclusion, results, acknowledgments and references.
5. Authors should submit paper in a ZIP archive if any supplementary files are required along with the paper.
6. Proper permissions must be acquired for the use of any copyrighted material.
7. Manuscript submitted *must not have been submitted or published elsewhere* and all authors must be aware of the submission.

Declaration of Conflicts of Interest

It is required for authors to declare all financial, institutional, and personal relationships with other individuals and organizations that could influence (bias) their research.

Policy on Plagiarism

Plagiarism is not acceptable in Global Journals submissions at all.

Plagiarized content will not be considered for publication. We reserve the right to inform authors' institutions about plagiarism detected either before or after publication. If plagiarism is identified, we will follow COPE guidelines:

Authors are solely responsible for all the plagiarism that is found. The author must not fabricate, falsify or plagiarize existing research data. The following, if copied, will be considered plagiarism:

- Words (language)
- Ideas
- Findings
- Writings
- Diagrams
- Graphs
- Illustrations
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- Printed material
- Graphic representations
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- Electronic material
- Any other original work

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2. Drafting the paper and revising it critically regarding important academic content.
3. Final approval of the version of the paper to be published.

Changes in Authorship

The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

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Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

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Preparing your Manuscript

Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

For scanned images, the scanning resolution at final image size ought to be as follows to ensure good reproduction: line art: >650 dpi; halftones (including gel photographs): >350 dpi; figures containing both halftone and line images: >650 dpi.

Color charges: Authors are advised to pay the full cost for the reproduction of their color artwork. Hence, please note that if there is color artwork in your manuscript when it is accepted for publication, we would require you to complete and return a Color Work Agreement form before your paper can be published. Also, you can email your editor to remove the color fee after acceptance of the paper.

Tips for writing a good quality Medical Research Paper

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of medical research then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

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Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
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References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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