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Original Article

The Outcome of Pregnancy in Women with Normal V/S High Salt Intake Presenting in a Hospital of Northern Region of Pakistan

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ABSTRACT

Objective: To compare the outcome of pregnancy in women with normal versus high salt intake presenting in a hospital of northern region Pakistan.

study design: quasi experimental study.

Place and Duration of Study: Department of Gynecology and Obstetrics, Combined Military Hospital, Gilgit Pakistan, from Feb 2023 to Feb 2024.

Methodology: This study was conducted on the pregnant women attending the department for antenatal checkup in these study dates. Daily salt intake was calculated with the help of dietician by calculating the overall consumption of sodium chloride in different forms during the day. Women were divided into two groups on this basis as having normal or high salt intake. Both the groups were followed up till the time of delivery for any maternal or fetal complications.

Results: A total of 1000 pregnant women were included in the final analysis who were followed up till delivery. Mean age of the study participants was 26.66±5.15 years. Out of the babies born, 527(52.7%) were males and 473(47.3%) were females. Out of 1000 women, 450(45%) were classed as having normal salt intake while 550(55%) were classed as having high salt intake. Statistical analysis showed that intrauterine growth retardation, oligohydramnios, pregnancy induced hypertension and preeclampsia were found significantly more in women who had high salt intake (p-value<0.01).

Conclusion: A significant number of pregnant women in Gilgit and surrounding areas were having high salt intake. Both maternal and fetal complications studies were found significantly more in women with high salt intake as compared to women with normal salt intake.

Keywords: Fetal growth retardation; Infant; Pregnancy; Sodium Chloride; Preeclampsia; Oligohydramnios.

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INTRODUCTION

Maternal and neonatal mortality and morbidity has been an alarming issue in developing countries including Pakistan.[1] Multiple factor influence these parameters and public health experts have been trying to find out simple and cost effective ways to prevent these complications.[2] Disruption in maternal homeostasis or any disease process in maternal body may lead to multiple complications in mothers as well as babies including pregnancy induced hypertension, preeclampsia, eclampsia, intrauterine growth retardation, low APGAR score at birth or intrauterine or early neonatal death.[3,4] Studies have revealed that high people living at high altitude have more salt intake as compared to people living at ground level.[5,6]

Maldonado et al. in their study published in 2024 concluded that certain types of diets were associated with incidence of hypertension among the pregnant women.[7] Female Sprague–Dawley ratswere used for an animal study to look for effects of high salt intake on maternal meta-inflammation and foetal growth. Both parameters were adversely affected by high salt intake.[8] A systematic review published by Duley *et al*., revealed that no conclusive relationship existed between salt intake during pregnancy and risk of eclampsia. However, it was suggested that more studies should be done in this regard to ascertain any relationship between the parameters.[9]

Maternal and child mortality and morbidity statistics are alarming both in big cities and rural areas.[10] Multiple factors determine the lifestyle practices in high altitude rural areas. Salt intake especially in daily tea consumption is high in most of the individuals and this does not change even in pregnancy. We designed this study with the rationale

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to compare the outcome of pregnancy in women with normal versus high salt intake managed during pregnancy at Combined Military Hospital Gilgit.

METHODOLOGY

This Quasi-experimentalstudy was conducted at thedepartment of Gynecology and Obstetrics, Combined Military Hospital Gilgit from February 2023 to February 2024.Sample size was calculated by WHO Sample Size Calculator by using population prevalence proportion of complications in pregnancies with high salt intake as 1.4% and normal salt intake as 0.4%.[11] Non probability Consecutive sampling technique was used to gather the sample.

Inclusion Criteria: All the pregnant women between the age of 18 and 40 who came for antenatal checkup in first trimester of pregnancy were recruited for this study.

Exclusion Criteria: Those women who were already diagnosed with any complications or had history of previous pregnancy or birth related complications were not recruited. Women who could not recall and ascertain their salt intake were excluded. Women with uncontrolled metabolic diseases during or prior to pregnancy were also not made part of this study.

After ethical approval from the ethical review board committee via IREB letter no. Trg/EC/Feb/01 and written informed consent from thepregnant women; this study commenced at the department. Women at first antenatal visit underwent detailed evaluation including history and physical examination along with relevant investigations. Salt intake history was taken in detail from all the women. As there is a culture of adding 1/4thteaspoon of salt in tea and usually 4 to 6 cups of tea are consumed by an individual therefore dietary history of each day was taken from all the study participants by dietician. WHO recommends daily salt intake (sodium) less than 5 gm; therefore 5 gm daily intake was used as cutoff in our study to make two study groups for the sake of comparison.[12] Both the groups were not provided with any intervention regarding salt intake and were followed up for subsequent period of pregnancy. Women in both the groups were evaluated for oligohydramnios, intrauterine growth retardation,[13] pregnancy induced hypertension and preeclampsia.[14]

Statistical analysis was done by using Statistical package for Social Sciences (SPSS 23.0). Mean and standard deviation was calculated for age of the pregnant women. Frequency and percentages were calculated for complications studied in both the groups. Pearson chi-square and Fischer exact tests were applied to look for any significant difference in complication among the two study groups. The *p*-value of less than or equal to 0.05 was considered significant in this study to establish the difference in any of the complications in both the groups.

RESULTS

A total of 1000 pregnant women were included in the final analysis who were followed up till delivery. Mean age of the study participants was 26.66±5.15 years. Out of the babies born, 527(52.7%) were males and 473(47.3%) were females. Table-I showed the general characteristics found regarding mothers and neonates recruited for this study. Out of 1000 women, 450(45%) were classed as having normal salt intake while 550(55%) were classed as having high salt intake. Out of total 597(59.7%) were primiparous while 403 (40.3%) were multiparous.

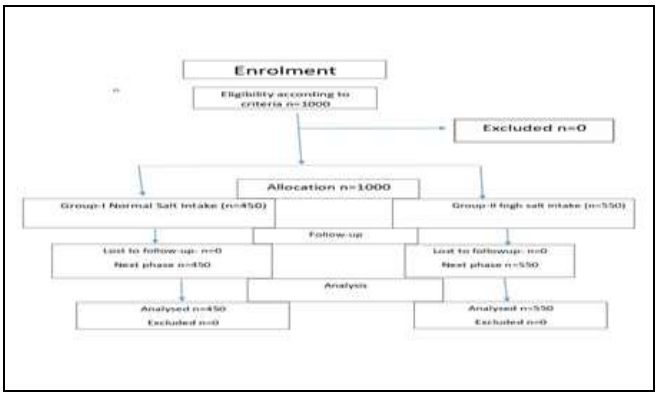

Figure: Consort Flow Diagram for this Study (n=1000)

Table-I: Characteristics of Women and Fetuses Included in the Study (n=1000)

Study Parameters	n(%)
Age of Mothers (years)	
Mean±SD	26.66±5.15years
Gender of Babies	
Male	527(52.7%)
Female	473(47.3%)
Parity	
Primiparous	597 (59.7%)
Multiparous	403 (40.3%)
Salt intake	
Normal	450(45%)
High	550(55%)
Outcomes	
Oligohydramnios	282(28.2%)
Intrauterine growth retardation	94(9.4%)
Pregnancy induced hypertension	422(42.2%)
Preeclampsia	227(22.7%)

With regards to complications 282(28.2%) had oligohydramnios, 94(9.4%) had intrauterine growth retardation, 422(42.2%) had pregnancy induced hypertension while 227(22.7%) had preeclampsia. Table-II showed the results of statistical analysis. Two groups were made on the basis of salt intake and it was revealed that intrauterine growth retardation(*p*-value<0.001), oligohydramnios(*p*-value<0.001), pregnancy induced hypertension (*p*-value<0.001) and preeclampsia (*p*-value<0.001) were found significantly more in women who had high salt intake.

Table-II: Comparison of maternal and fetal complications among women with normal vs high salt intake (n=1000)

Outcome parameters	Normal Salt intake	High salt intake	p-value
Intrauterine Growth Retardation			
No	433(96.2%)	473(86.0%)	<0.001
Yes	17(3.8%)	77(14.0%)	
Oligohydramnios			
No	391(86.9%)	327(59.5%)	<0.001
Yes	59(13.1%)	223(40.5%)	
Pregnancy Induced Hypertension			
No	316(70.2%)	262(47.6%)	<0.001
Yes	134(29.8%)	288(52.4%)	
Preeclampsia			
No	382(84.8%)	391(71.1%)	<0.001
Yes	68(15.2%)	159(28.9%)	

DISCUSSION

Multiple determinants of maternal and child mortality and morbidity have been studied and included in guidelines worldwide. Few parameters are still under debate and research which could be potentially linked to maternal and child morbidity. Increased salt intake is one of these parameters. High altitude physiology is somewhat different from ground level in a lot of parameters due to several reasons. Dietary patterns are also different at high altitude which are sometime evidence based to meet the challenges of difficult terrain and sometime based on local myths. Taking added salt in tea and having multiple cups of tea especially in winters is a normal routine in these areas. We therefore conducted this study with an aim to compare the outcome of pregnancy in women with normal versus high salt intake managed during pregnancy at Combined Military Hospital Gilgit.

Seo *et al.*, in 2020 published a study regarding role of maternal dietary interventions in preventing maternal and foetal complication and found out that restricting and modifying both sugar and salt intake were associated with better outcomes of pregnancy.[15] Our study design was slightly different and we just observed the difference in complication among those with normal and high salt intake and found out that women who had high salt intake had more chances of having both maternal and foetal complications.

Mayer-Davis *et al.*, published an interesting review in 2020 regarding beverage consumption during pregnancy and birth weight of babies. They concluded that tea intake was not significantly associated with birth weight in their data set.[16] Our study population had high tea intake with each cup of tea having added salt and it was clearly observed in our data set that women with high salt intake (mostly in the form of added salt in tea) had more chances of having complications.

Systematic review and meta-analysis of nutritional interventions to prevent of gestational hypertension and preeclampsia was published in 2023 by Imanpour *et al.*, It was revealed that.

Not restricting salt but managing it reduced the chances of pregnancy induced hypertension. Preeclampsia was not affected by the dietary interventions.[17] A significant number of pregnant women in Gilgit and surrounding areas were having high salt intake. Both maternal and fetal complications studies were found significantly more in women with high salt intake as compared to women with normal salt intake.

Mao *et al.*, demonstrated in their study conducted that high salt intake during pregnancy affected the renin angiotensin system of the baby and may result in different complications.[18] IUGR and oligohydramnios were both seen more in women who had more salt intake in our study as compared to those who had normal salt intake.

LIMITATIONS OF STUDY

Salt intake was determined by patients account. Chances of recall bias become more when scandalized tool is not used for the said purpose. Other factors which may cause complications were not fully controlled therefore with this study design it cannot be concluded that these complications occurred due to high salt intake. Dropout rate was quite high as women from far flung rural areas were lost to follow up.

CONCLUSION

A significant number of pregnant women in Gilgit and surrounding areas were having high salt intake. Both maternal and fetal complications studies were found significantly more in women with high salt intake as compared to women with normal salt intake.

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Conflict of Interest. None.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

RG & AR: Data acquisition, data analysis, critical review, approval of the final version to be published.

MA & FM: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

FZ & UIK: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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