Prevalence of Urinary Tract Infection in School Children and Associated Complications

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ABSTRACT:

Aim

To study prevalence, risk and associated complications of urinary tract infection in school children.

Objective

To examine the prevalence rate of urinary tract infection in school children which are undiagnosed and to determine risk factor and complications of UTI in children. To create awareness on UTI in school children and counsel the parents and children regarding diet, fluid intake and maintenance hygiene.

Background

Urinary tract infections (UTIs) are common among children and can lead to serious complications if left untreated. This study aimed to determine the prevalence and complications of UTIs among school children.

Method

A total of [500] school girl children aged [10-17 years] were included in the study. Participants are to complete a questionnaire to assess their symptoms, knowledge and practices related to UTIs.

Results

The prevalence of UTIs was found to be [65%], with the highest prevalence observed among children aged [10-12 years]. Common symptoms included fever, chills, lower back or pelvic pain and burning micturition. Factors such as inadequate hydration, holding urine for extended periods, and poor hygiene during menstruation, irregular menstrual cycles were associated with higher UTI prevalence. A lack of knowledge about UTIs and hygiene was noted among students and parents.

Conclusion

Our study concludes that a significant proportion of school children suffer from UTIs, largely due to poor hygiene practices and lack of awareness.

Educational interventions in schools regarding UTI prevention, proper menstrual hygiene management (MHM), adequate hydration, and timely urination are essential. Enhancing knowledge and practices related to these factors can reduce the prevalence of UTIs and associated complications, improving the health and well-being of school children.

Key words: Urinary tract infection, Prevalence, burning micturition, Menstrual hygiene management.

INTRODUCTION

A Urinary tract infection (UTI) is an infection of any part of urinary system- kidneys, ureturs, bladder and urethra. Most infection involve the lower urinary tract- the bladder and the urethra. Infections of the urinary tract represent a wide variety of clinical syndromes including urethritis, cystitis, prostitis, and pyelonephritis. A urinary tract infection (UTI) is defined as the presence of microorganisms in the urine that cannot be accounted for by contamination. The organisms have the potential to invade the tissues of the urinary tract and adjacent structures. Lower tract infections include cystitis (bladder), urethritis (urethra), prostatitis (prostate gland), and epididymitis. Upper tract infections involve the kidney and are referred to as pyelonephritis. Uncomplicated UTIs are not associated with structural or functional abnormalities that may interfere with the normal flow of urine or the voiding mechanism. Complicated UTIs are the result of a predisposing lesion of the urinary tract, such as a congenital abnormality or distortion of the urinary tract, stone, indwelling catheter, prostatic hypertrophy, obstruction, or neurologic deficit that interferes with the normal flow of urine and urinary tract defenses. (1)

MENSTRUAL COMPLICATIONS ASSOCIATED WITH URINARY TRACT INFECTION:

Women's hygiene-related behavior during menstruation is extremely important since it affects their health by making them more susceptible to diseases of the renal system and reproductive systems (RTI). It is clear how socioeconomic status, menstrual hygiene behaviors, and RTI interact. Renal infection, RTI, and its complications affect millions of women today, and the illness frequently spreads to the pregnant woman’s unborn child. Women who are more educated about safe procedures for menstrual hygiene are less susceptible to UTI, RTI, and its effects.

Infection limited to the bladder can be painful and annoying. However, serious consequences can occur if a UTI spreads to the kidneys.

(Good) MHM requires a minimum level of knowledge and awareness in women and adolescent girls to manage their menstruation effectively and hygienically by using a clean material to absorb or collect menstrual blood, practicing good hygiene and personal care during their period, and having access to facilities to wash or dispose of used menstrual management materials with dignity and in an environmentally responsible manner. (15)

RESUITS AND DISCUSSION:

Table.1. Urinary Tract Infection Among the Students

Number of students with UTI	323(Percentage: 65%)
Number of students with non-UTI	177(Percentage:35%)

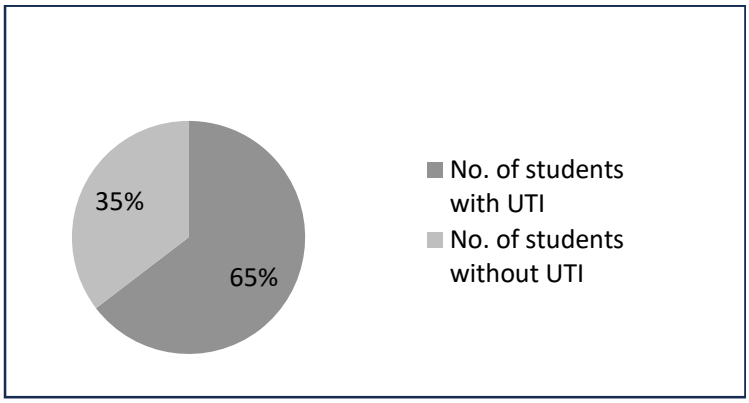

Fig.1: urinary tract infection among the students

The above Pie chart shows about Urinary tract infection among the students. Out of 500 students, 323(65%) students are suffering with UTI and 177(35%) students with non-UTI.

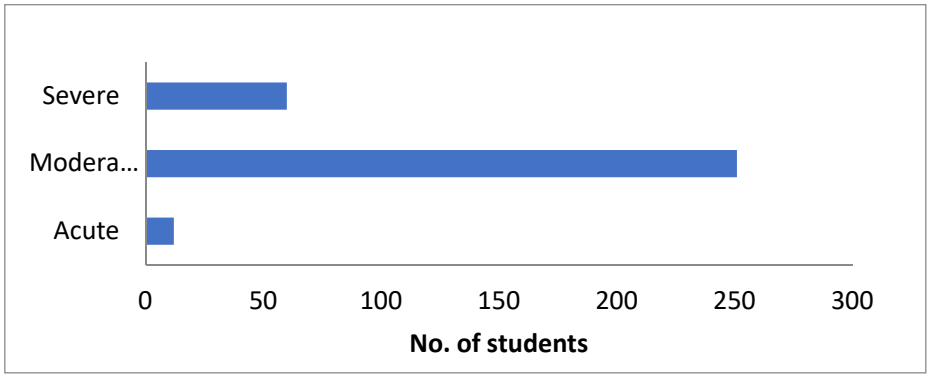

Fig.2: Severity of Urinary tract infection among the UTI students

According to this graph it shows the severity of UTI condition among the UTI student. Out of 323 students 12(4%) are suffering with acute UTI,251(78%) students are suffering with moderate condition and 60(18%) are suffering with severe UTI condition.

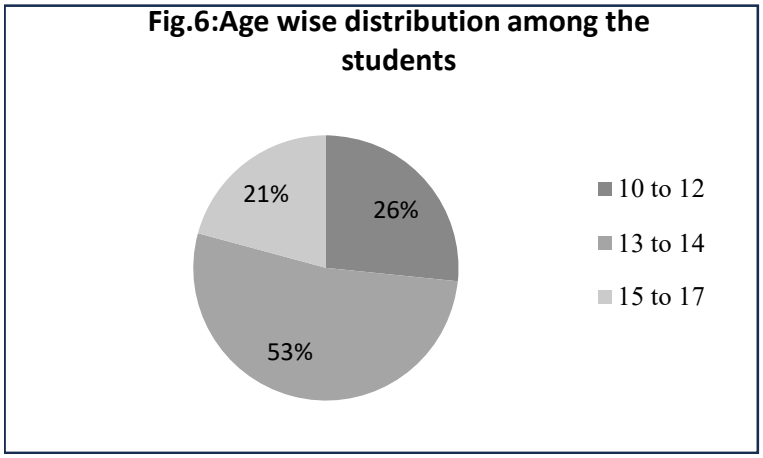

Fig.3: Age wise distribution among the students

According to this graph, it shows distribution of total number of students age wisely. Out of the 500 students, 133(26%) are between the age of 10-12 years, 263(53%) are between 13-14 years and 104(21%) students are between the age of 15-17 years.

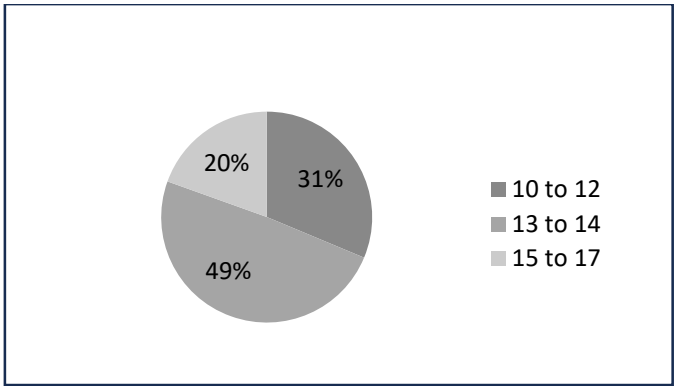

Fig.4: Age wise distribution of urinary tract infection among the students

The above chart shows about distribution of urinary tract infection among students age wisely. Out of 323 students, 101(31%) are between 10-12 years, 159(49%) are between the 13-14 years and 63(23%) are between 15-17 years of age.

Table.2. Which age group of students suffering more?

Age group	Total no. of students age wise	No. of students with UTI age wise	Percentage age wise
10-12	133	101	75.9%
13-14	263	159	60.4%
15-17	104	63	60.5%

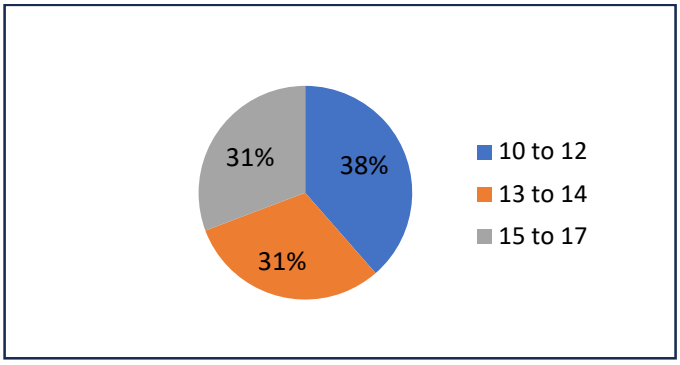

Fig.5: Which age group students suffers more?

Above graph depicts the which age group students suffering with more UTI. According to this graph 10 to 12 age group students suffering with UTI than 13 to 14 and 15 to 17 age group of students.

Table.3. Symptomatic distribution among the total students

Symptoms	No. of students	Percentage
Pain or Burning sensation when urinating	282	11%
Urgent need to urinate	349	14%
Fever and chills	442	17%
Pain in lower back or around the pelvis	413	16%
Frequent urination	175	7%
Foul-smelling cloudy or bloody urine	75	3%
Yellow color urination	347	13%
Passing frequent and small amounts of urine	139	5%
Vomiting and Diarrhea	369	14%

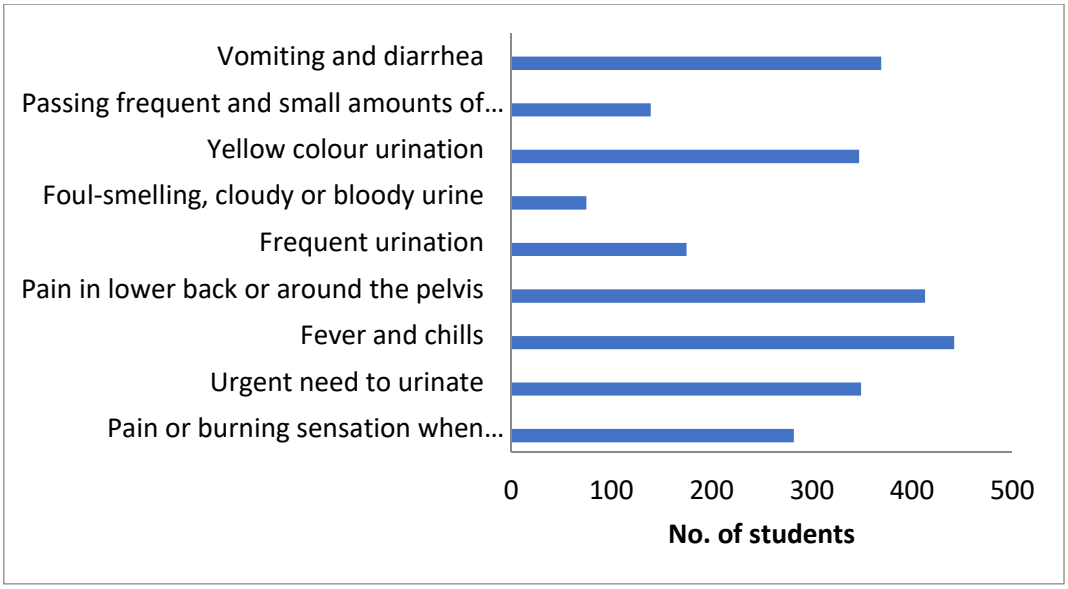

Fig.6: Symptomatic distribution among the total students

Table.3.1. Symptomatic distribution among the UTI students

Symptoms	No. of students	Percentage
Pain or Burning sensation when urinating	261	12%
Urgent need to urinate	267	13%
Fever and chills	311	15%
Pain in lower back or around the pelvis	308	15%
Frequent urination	158	8%
Foul-smelling cloudy or bloody urine	66	3%
Yellow color urination	273	13%
Passing frequent and small amounts of urine	131	6%
Vomiting and Diarrhea	303	15%

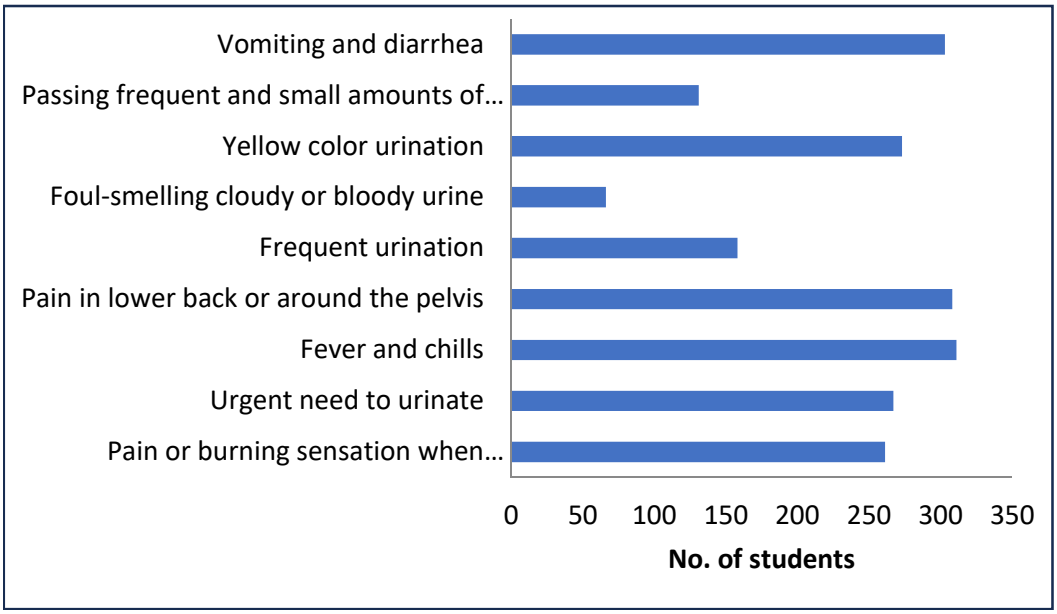

Fig.7: Symptomatic distribution among the UTI students

The above graph shows symptomatic distribution among the 323 UTI students. The comparison between Urinary tract infection and non-urinary tract infection based on symptomatic distribution among the students we got statistically significant with P value <0.00001. The result is significant at $p<0.05$. The f ratio value is 27.48151.

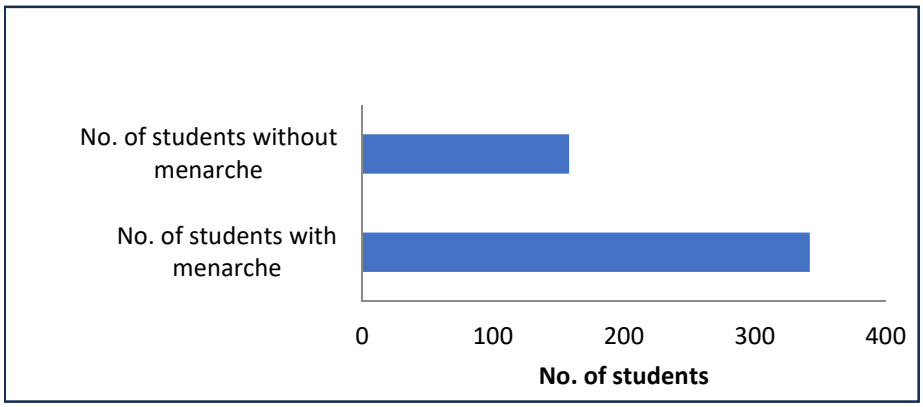

Fig.8: Distribution of Menarche & Non-menarche among the students

The above graph depicts about menarche and non-menarche students. Out of 500 students 342 (68%) students has started menstrual cycle and 158(32%) are non-menarche students.

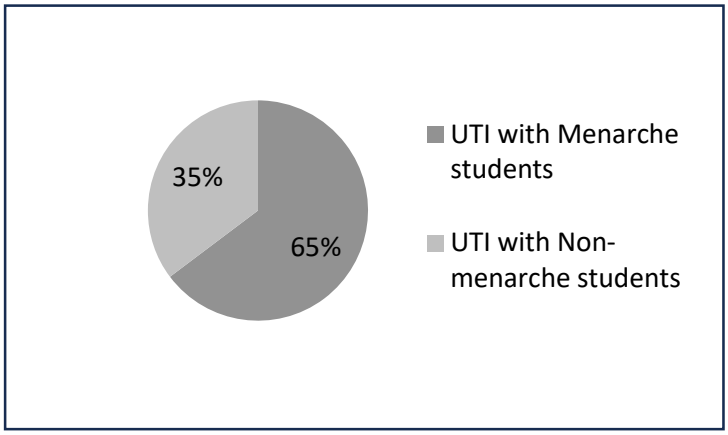

Fig.9: Distribution of Urinary tract infection students with & without menarche

The above pie chart shows UTI in students with menstrual cycle and without menstrual cycle. Out of 323 students 209(65%) students are menarche students, those are suffering with UTI and 114(35%) students are non-menarche students with UTI.

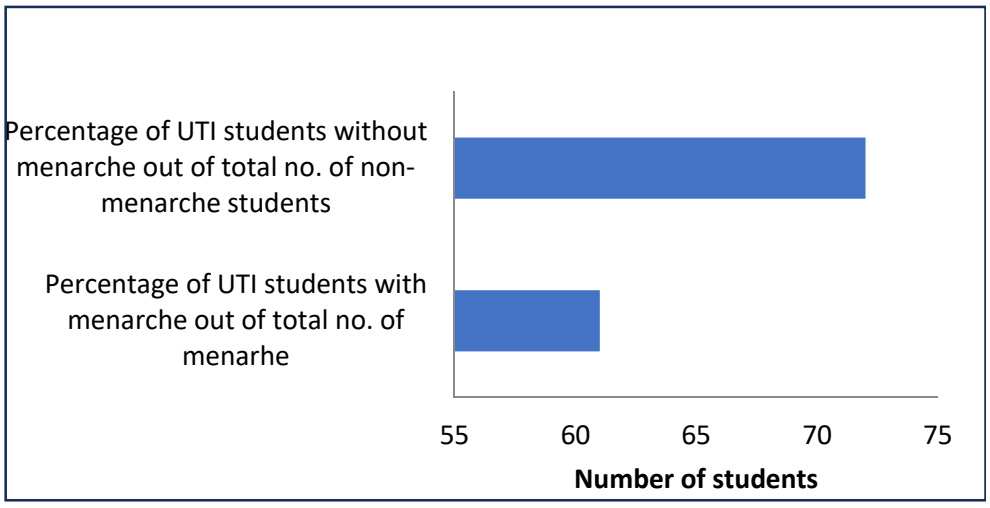

Fig.10: which students suffer more UTI with or without menarche?

Above graph shows the which students are more suffer with UTI with or without Menarche. Based on above graph non-menarche students suffer more with UTI than menarche students.

Table.4. Distribution of UTI students based on regularity of menstruation

Number of students with UTI who has regular menstrual cycle	86 (Percentage: 41%)
Number of students with UTI who has irregular menstrual cycle	123 (Percentage: 59%)

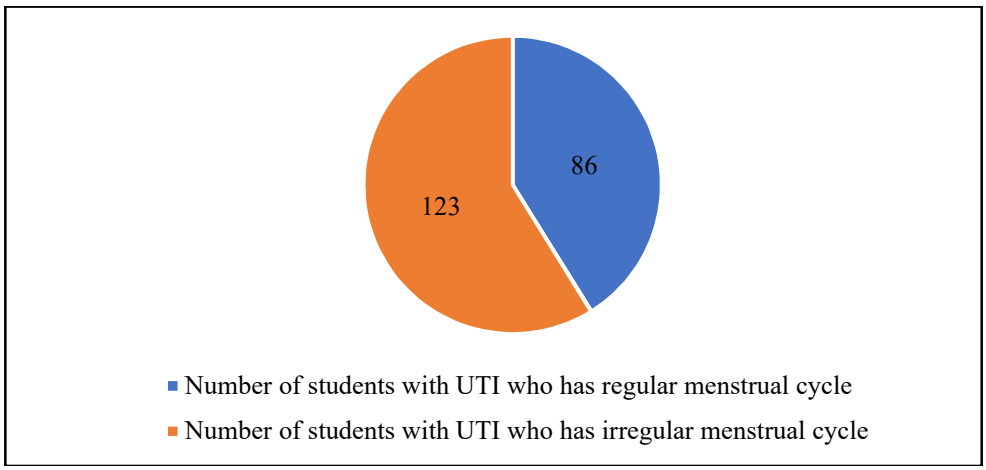

Fig.11: Distribution of UTI students based on regularity of menstruation

Above graph depicts the UTI with regular and irregular menstrual cycle among the students. Out of 209 students 86(41%) who has UTI with regular menstrual cycle and 123(59%) has UTI with irregular menstrual cycle.

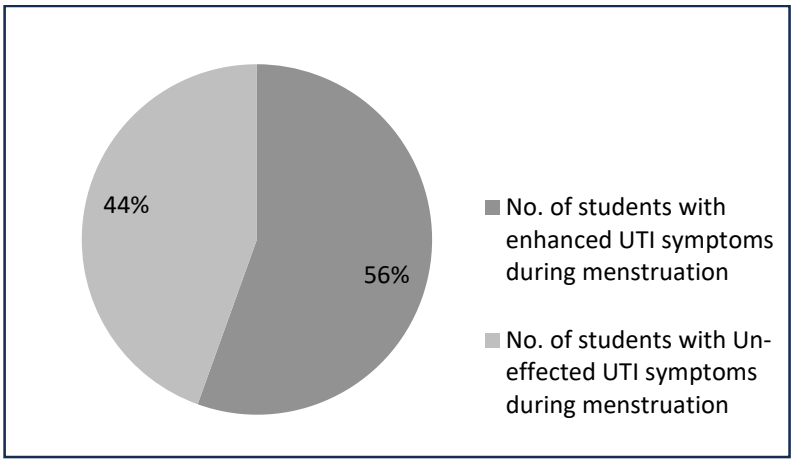

Fig.12: Enhancement of UTI symptoms during menstruation among the menarche students

Above chart shows enhancement of UTI symptoms during menstruation among the menarche students. Out of 209 students, 116 (56%) are with enhanced UTI symptoms during menstruation and 93(44%) has un-effected UTI symptoms during menstruation.

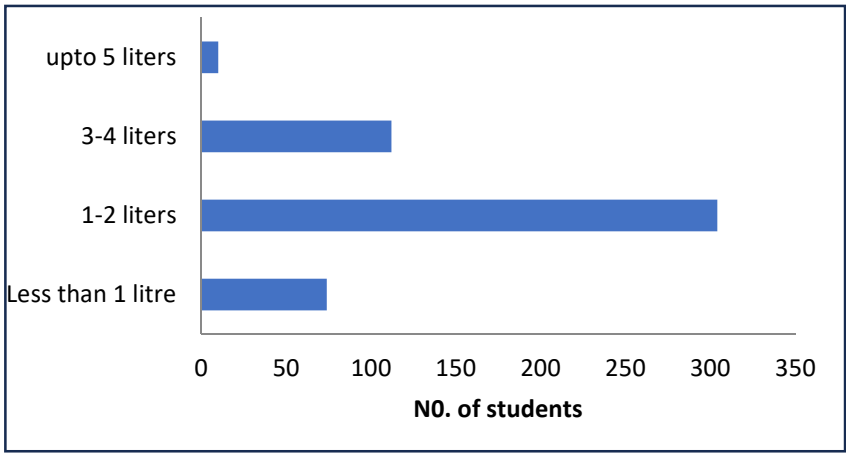

Fig.13: Water intake among the total students

The above graph shows, water intake among the students. Out of 500 students, 74(15%) students drink less than 1 liter, 304(61%) students drink 1-2 liters, 112(22%) students drink 3-4 liters & 10(2%) students drinks up to 5 liters.

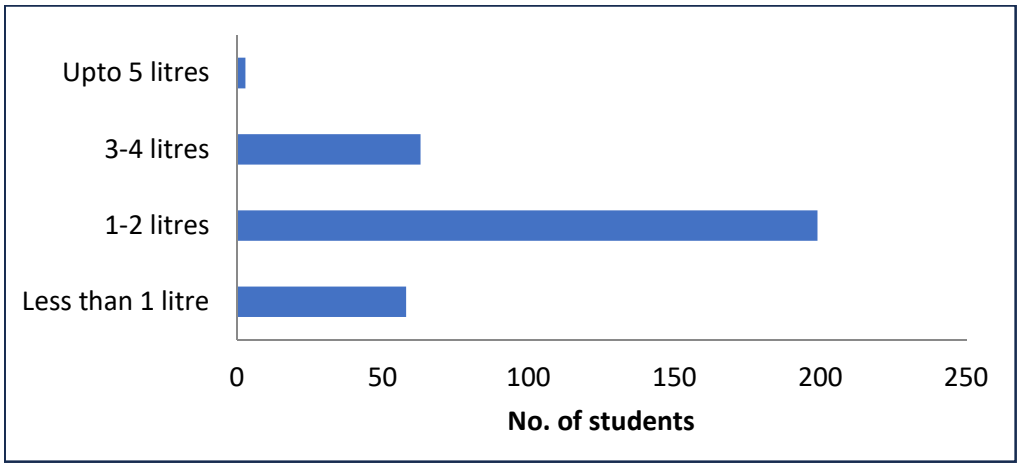

Fig.14: Water intake among the UTI students

The above bar graph depicts about the water intake among the UTI students. Out of 323 students, 58(18%) students drink less than 1 liter, 199(62%) students drink 1-2 liters, 63(19%) students drink 3-4 liters & 3(1%) students drinks 4-5 liters.

Table.5. Which students suffer with more UTI based on water intake?

Water in liters	Total no. of students	No. of students with UTI	Percentage
Less than 1 liter	74	58	78.3%
1-2 liters	304	199	65.4%
3-4 liters	112	63	56.2%
Up to 5 liters	10	3	30%

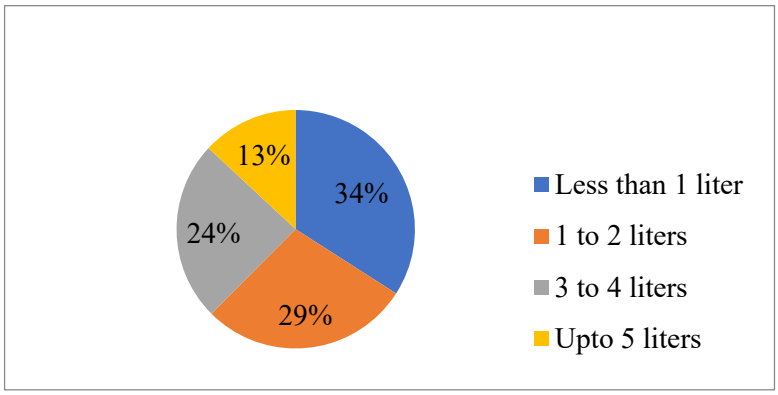

Fig.15:Which students suffer with more UTI based on water intake?

Above graph shows students which drinks different level of water who have more UTI. Based on this graph students who drinks less than 1 liter of water suffering with more Urinary tract infection.

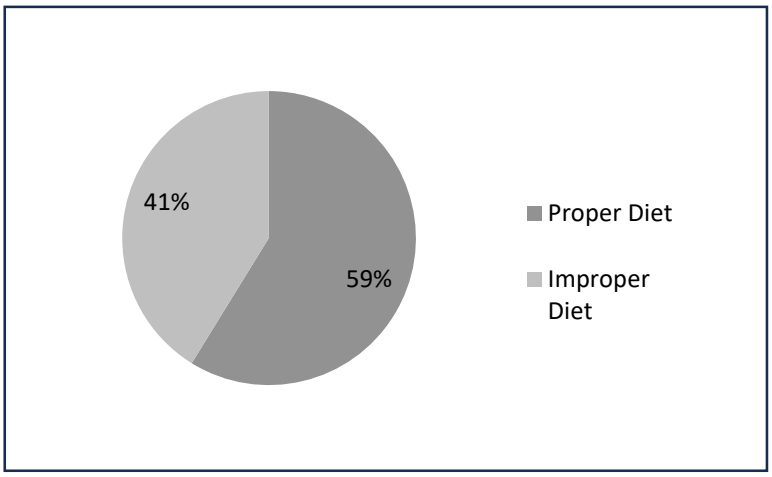

Fig.16: Dietary changes in students

The above pie chart shows that, out of 500 students, 294(59%) students are on proper diet & 206(41%) students are on improper diet.

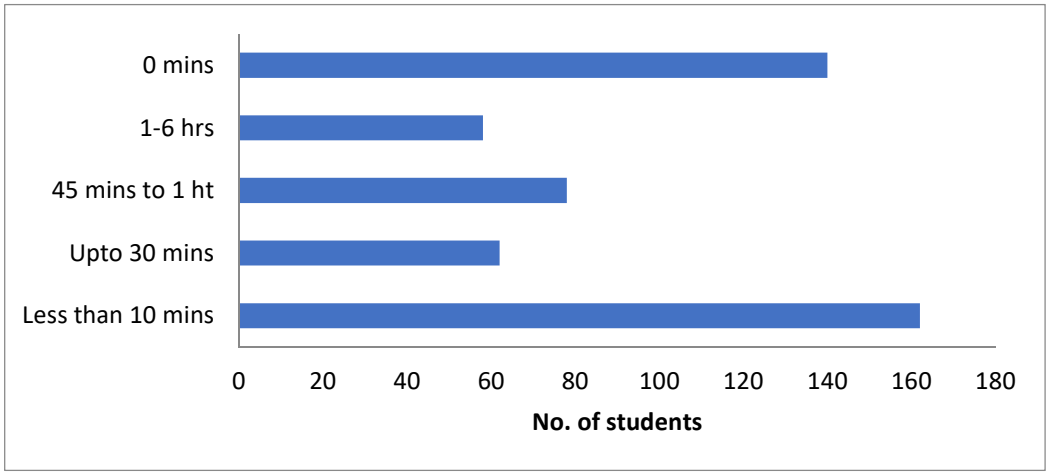

Fig.17: Holding time of urine

The above Bar diagram depicts about the different Holding times of urine in students.

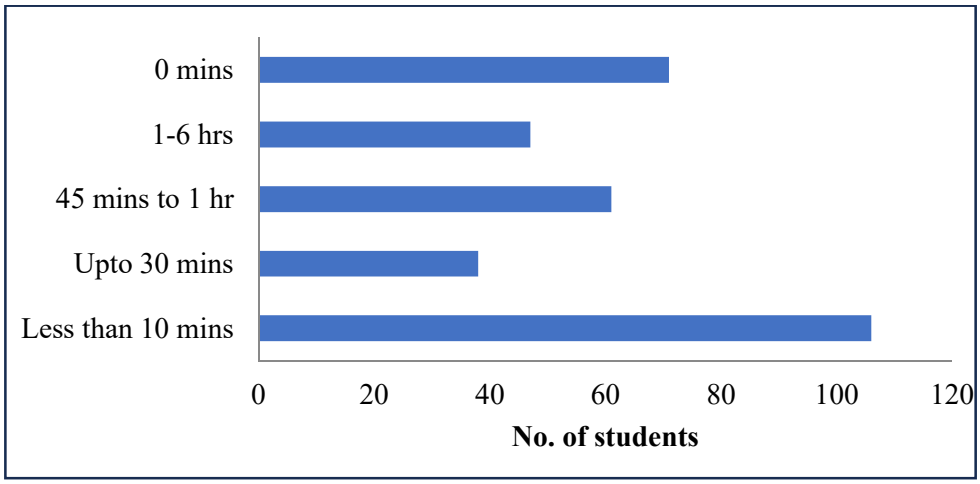

Fig.18: Holding time of urine in UTI students

The above Bar diagram depicts about the different Holding times of urine in students with UTI.

Table.6. Which students suffer more UTI based on holding time?

Holding time of Urine	Total no. of students	No. of students with UTI	Percentage
Less than 10 minutes	162	106	65.4%
Up to 30 minutes	62	38	61.2%
45 minutes to 1 hour	78	61	78.2%
1-6 hours	58	47	81%
0 minutes	140	71	50.7%

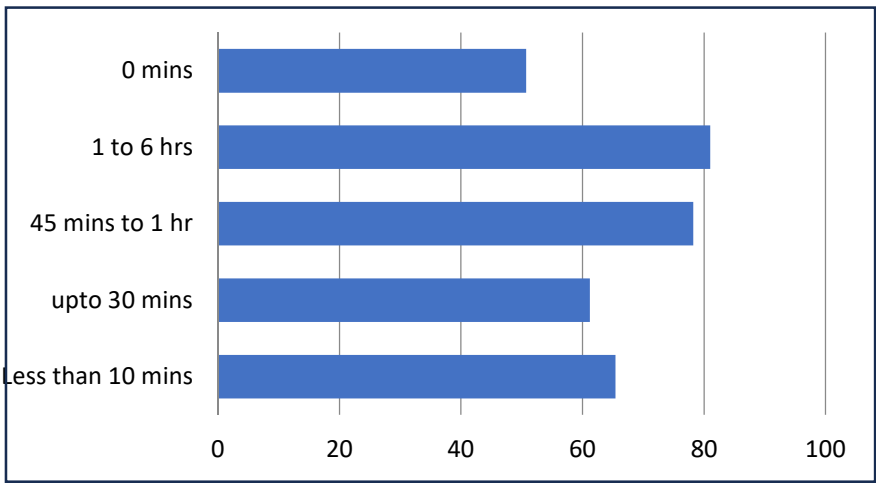

Fig.19: Which students suffer more UTI based on holding time?

Above graph shows which students suffers more UTI with holding time. Based on this graph Students hold for 1 to 6 hours are suffers more with Urinary tract infection. The correlation between Urinary tract infection and holding time we got statistically significant with P value <0.03301. The result is significant at p<0.05. The value of t is -3.196655.

Table.7. Awareness on UTI, Menstruation & importance of Hygiene among the students

Awareness among the students	No. of students	Percentage
Awareness	195	39%
Non-awareness	305	61%

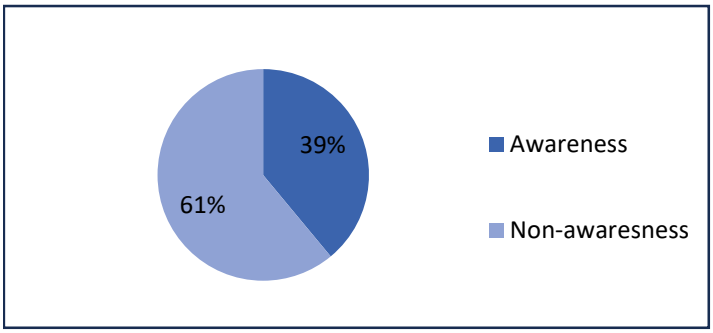

Fig.20: Awareness among the students

The above Pie-chart shows that, 195(39%) students has awareness & 305(61%) students has no awareness on UTI, menstruation & importance of hygiene.

DISCUSSION:

In our study, out of a total of 500 students, 323 students (65%) have been diagnosed with a Urinary Tract Infection (UTI), while 177 students (35%) do not have a UTI. This high prevalence indicates a significant health issue within the student population that warrants further investigation and intervention.

The majority of the students (78%) experience moderate UTI, while 18% have severe UTI, and only 4% have acute UTI.The high percentage of moderate and severe cases suggests that many students might not be seeking timely medical intervention or are exposed to conditions that exacerbate their UTI severity.

The age group distribution shows that the majority of the students fall within the 13-14 years range (53%). This could be due to puberty-related changes that might increase susceptibility to infections.

The prevalence of UTI is highest among the youngest age group (10-12 years) at 75.9%, compared to 60.4% and 60.5% for the other age groups. The highest prevalence is in the youngest age group (10-12 years), suggesting that younger children may be more susceptible to UTIs. This could be due to various factors, including hygiene practices and anatomical differences. Isa et al. (2013) also reported higher prevalence rates among younger children in primary school, supporting this finding.

Among students with UTI, the most common symptoms are fever and chills (17%), pain in the lower back or pelvis (16%), and vomiting and diarrhea (14%). These symptoms indicate a systemic response to infection, which might affect the students'

overall health and academic performance. These symptoms can significantly impact a child's daily life and well-being, emphasizing the importance of early detection and treatment. These symptoms align with the common clinical presentations of UTIs in children, as outlined by Vasudevan (2014).

For students without UTI, symptoms like frequent urination and pain during urination are still present, albeit at lower percentages, suggesting other underlying health issues or possible misdiagnoses.

The data indicates a higher prevalence of UTI among students who have reached menarche (61%) compared to those who haven't (72%). This suggests that hormonal changes and menstrual hygiene management could play significant roles in the development of UTIs.

Students with irregular menstrual cycles are more likely to have UTIs (59%) than those with regular cycles (41%), highlighting the need for targeted interventions for students with menstrual irregularities.

Over half of the students with UTIs experience enhanced symptoms during menstruation, underscoring the interplay between menstrual cycles and UTI severity.

Students consuming less water have a higher prevalence of UTIs, with 78.30% of those drinking less than 1 liter suffering from UTIs. Adequate hydration is essential for maintaining urinary tract health. This aligns with the general understanding that low fluid intake can contribute to the development of UTIs (Kaufman et al., 2019).

Diet plays a critical role in overall health, including urinary health. A proper diet can help maintain a healthy immune system to prevent infections.

Out of 206 students with an improper diet, 143 have developed UTI due to their poor dietary habits.

Holding urine for extended periods (1-6 hours) shows the highest UTI prevalence (81%), indicating that timely urination is crucial in preventing infections (Vasudevan, 2014).

A significant number of students (39%) are unaware of UTI causes, prevention, and treatment and hygiene maintenance, highlighting the need for better health education and awareness programs in schools. At Hoen et al.

(2021) emphasized the importance of education and guidelines in managing pediatric UTIs, supporting the need for increased awareness and preventive measures.

A significant number of students (176) are using 2 sanitary napkins per day and 170 students are using 3 per day and 57 are using 1 sanitary napkin per day. Among the 305 students who lack awareness about UTIs, 227 have developed UTI as a result of this ignorance.

In our study, we examined the relationship between various factors and the incidence of urinary tract infections (UTIs) among the school children.

The factors analyzed included the holding time of urine, insufficient water intake, improper diet, lack of awareness about UTIs, and the onset of menarche in female students. The Pearson correlation coefficient (r) was found to be 0.9561, indicating a strong positive correlation and the relationship is statistically significant. This implies that an increase in these habits corresponds to a greater likelihood of UTIs among the students.

CONCLUSION:

With our overall study, we concluded that 65% students are suffering with UTI and most of them suffering with moderate condition and most of the students are suffering with symptoms include pain in lower back or around the pelvis, fever and chills, vomiting and diarrhea and pain or burning sensation when urinating. The underlined cause of this complications is less water intake, holding of urine for long time, poor hygiene during menstruation, lack of proper nutrition and lack of awareness for children. Due to poor hygiene during menstruation leads to the enhancement of UTI symptoms. By conducting

awareness in schools about Urinary tract infection, menstruation, water intake, holding time and diet, basic knowledge has been provided, this may reduce further Urinary tract infections and other associated complications.

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