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Knowledge and Application of Antibiotics in the Everyday Life of Students at the Faculty of Health Science

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Abstract:

Antibiotics constitute a group of medications used to treat infections caused by bacteria and their colonization. A casual understanding of the importance of rational antibiotic use results in antimicrobial resistance, leading to the ineffectiveness of the drug when it is most needed. Today, a pressing issue is bacterial resistance to antibiotics, one of the reasons being poor antibiotic management and insufficient knowledge about them. The purpose and objective of this research were to assess the knowledge and use of antibiotics among students of the Faculty of Health Sciences at the University of Sarajevo. This study involved 151 students, including 125 females (83%) and 26 males (17%). The survey comprised questions about general data on the significance and use of antibiotics. The importance of understanding antibiotics and knowing how to use them for specific problems is discussed in Chapter 3. of this scientific research paper.

Keywords: antibiotic, students, knowledge, usage, contraindications

Introduction:-

Antibiotics are toxic to bacteria, yet non-toxic or minimally toxic to the human organism. They exert their action on bacterial cells by inhibiting or halting the growth and replication of the bacteria themselves (Nogueira-Uzal et al., 2020). Failure to eradicate the bacteria leads to bacteriostatic effects, while bacterial destruction is termed bactericidal action. According to their mechanism of action, antibiotics are categorized into: those inducing cell wall inhibition (Penicillin, Ampicillin, Carbenicillin, Cephalosporin, Vancomycin, Cycloserine), antibiotics inhibiting protein synthesis (Streptomycin, Gentamicin), antibiotics inducing nucleic acid synthesis (Ciprofloxacin, Rifampicin, Metronidazole), antibiotics inhibiting metabolism (Dapsone, Sulfonamide, Trimethoprim, Isoniazid), and antibiotics disrupting cytoplasmic membrane functions (Gramicidin, Bacitracin, Nisin, Polymyxin) (Higuera-Gutiérrez et al.,

2020 ;Shahpawee et al., 2020). However, despite antibiotics' significant contributions to modern medicine, antimicrobial resistance is a recognized phenomenon occurring in bacteria, viruses, fungi, and parasites, posing a global threat to health and development. The World Health Organization has identified it as one of the top 10 global public health threats (Kutlesic and Jovanovic, 2020). Public awareness regarding antibiotics is inadequate, necessitating much greater education about their actions and potential side effects

Materials And Methods:-

The knowledge and usage of antibiotics in the everyday life of 151 students from the Faculty of Health Sciences, University of Sarajevo, were anonymously surveyed. The study included 125 (83%) female respondents and 26 (17%) male respondents, with an average age of 22.07 ± 2.51 years. Within this survey, data on the assessment of their knowledge and attitudes towards antibiotic

usage were covered. The questionnaire consisted of 38 questions divided into two parts. In the first part of the survey, respondents marked or wrote down their answers to the posed questions. The second part of the survey focused on assessing knowledge and attitudes regarding the proper treatment of antibiotic usage. Statistical data analysis was performed using IBM SPSS Statistics 26.00 (IBM Corporation, Armonk, New York).

Results:-

In Table 1. the results for participants' responses regarding general knowledge about antibiotics are presented. Approximately 80% of the participants (53,30%) completely agree that antibiotics are medications that can kill bacteria, while a smaller number, 32,0% (48 participants), partially agree. About 63,6% (96 participants) completely disagree that antibiotics are medications used to treat viral infections, while 20 participants (13,2%) partially agree. 46% of participants (69) completely disagree that antibiotics can treat all infections, while 19,3% (29) partially disagree

with the statement. Regarding the claim that antibiotics are prescribed to alleviate pain, 56% (84) of participants completely disagree, while 18% (27) partially agree. Participants partially agree and completely agree that antibiotics are prescribed to alleviate inflammation (125 participants: 41,3% : 42,0%), and to reduce elevated temperature, 48,7% (73 participants) completely disagree. Regarding penicillin being an antibiotic, 122 participants (80,8%) completely agree, while 12 participants (7,6%) partially agree and 11 participants (7,3%) neither agree nor disagree. For the statements that desloratadine is a new generation antibiotic and that ciprofloxacin does not belong to the group of antibiotics, the majority of participants (83: 57) provided neutral responses, neither agreeing nor disagreeing (55% : 37,7%). Additionally, the claim that paracetamol belongs to the group of antibiotics is completely rejected, with 73,5% (111 participants) completely disagreeing. Finally, 81,5% (123 participants) completely agree that antibiotics can cause allergic reactions, while 15,9% (24 participants) partially agree

Table 1. Analysis of responses to general knowledge questions about antibiotics

| | IDK | CD | PD | N/A | PA | CA |
|---|-------|-------|-------|-------|-------|-------|
| <i>Antibiotics are medications that can kill bacteria</i> | 0 | 5 | 1 | 16 | 48 | 80 |
| | 0,0% | 3,3% | 0,7% | 10,7% | 32,0% | 53,3% |
| <i>Antibiotics are medications used to treat viral infections</i> | 0 | 96 | 7 | 14 | 20 | 14 |
| | 0,0% | 63,6% | 4,6% | 9,3% | 13,2% | 9,3% |
| <i>Antibiotics can cure all infections</i> | 0 | 69 | 29 | 30 | 21 | 1 |
| | 0,0% | 46,0% | 19,3% | 20,0% | 14,0% | 0,7% |
| <i>Antibiotics are prescribed to alleviate pain</i> | 0 | 84 | 15 | 20 | 27 | 4 |
| | 0,0% | 56,0% | 10,0% | 13,3% | 18,0% | 2,7% |
| <i>Antibiotics are prescribed to alleviate inflammation</i> | 0 | 9 | 7 | 9 | 62 | 63 |
| | 0,0% | 6,0% | 4,7% | 6,0% | 41,3% | 42,0% |
| <i>Antibiotics are prescribed to reduce elevated body temperature</i> | 0 | 73 | 13 | 26 | 31 | 7 |
| | 0,0% | 48,7% | 8,7% | 17,3% | 20,7% | 4,7% |
| <i>Penicillin is an antibiotic</i> | 0 | 3 | 3 | 11 | 12 | 122 |
| | 0,0% | 2,0% | 2,0% | 7,3% | 7,9% | 80,8% |
| <i>Desloratadine is a new generation antibiotic</i> | 17 | 16 | 5 | 83 | 18 | 12 |
| | 11,3% | 10,6% | 3,3% | 55,0% | 11,9% | 7,9% |
| <i>Paracetamol belongs to the group of antibiotics</i> | 0 | 111 | 12 | 15 | 8 | 5 |
| | 0,0% | 73,5% | 7,9% | 9,9% | 5,3% | 3,3% |
| <i>Ciprofloxacin does not belong to the group of antibiotics</i> | 9 | 46 | 6 | 57 | 15 | 18 |
| | 6,0% | 30,5% | 4,0% | 37,7% | 9,9% | 11,9% |
| <i>Antibiotics can cause allergic reactions</i> | 0 | 0 | 0 | 4 | 24 | 123 |
| | 0,0% | 0,0% | 0,0% | 2,6% | 15,9% | 81,5% |

IDK- I don't know; CD- I completely disagree; PD- I partially disagree; N/A- Neither agree nor disagree; PA- I partially agree; CA- I completely agree

In Table 2. the results for respondents' answers regarding antimicrobial resistance are presented. A total of 4 questions were asked, and the responses are as follows: "Bacterial resistance to antibiotics is a significant public health issue worldwide" was completely agreed by 68,2% of respondents, while the smallest number of respondents partially disagreed, at 2,6%. „Irrational use of antibiotics can cause bacterial resistance to antibiotics" was completely agreed by 83,4% of respondents, with the smallest number sharing the opinion that they completely

disagreed (0,7%) or partially disagreed (0,7%). „It is extremely important to adhere to instructions regarding antibiotic use" was completely agreed by 98,7% of respondents, while 1,3% partially agreed with the statement. „As consumers of antibiotics, we can contribute to the growth or reduction of bacterial resistance to antibiotics through appropriate use" was completely agreed by 66,9% of respondents, while a larger number (21,9%) partially agreed, and a smaller number completely disagreed (3,3%), partially agreed (2,6%), and neither agreed nor disagreed (5,3%).

Table 2. Analysis of student responses related to antimicrobial resistance

| | IDK | CD | PD | N/A | PA | CA |
|---|-----------|-----------|-----------|-----------|-------------|--------------|
| <i>Bacterial resistance to antibiotics is a significant public health issue worldwide</i> | 0 0,0% | 0 0,0% | 4 2,6% | 8 5,3% | 36 23,8% | 103 68,2% |
| <i>Irrational use of antibiotics can cause bacterial resistance to antibiotics</i> | 0 0,0% | 1 0,7% | 1 0,7% | 2 1,3% | 21 13,9% | 126 83,4% |
| <i>It is extremely important to adhere to instructions regarding antibiotic use</i> | 0 0,0% | 0 0,0% | 0 0,0% | 0 0,0% | 2 1,3% | 149 98,7% |
| <i>As consumers of antibiotics, we can contribute to the growth or reduction of bacterial resistance to antibiotics through appropriate use</i> | 0 0,0% | 5 3,3% | 4 2,6% | 8 5,3% | 33 21,9% | 101 66,9% |

IDK- I don't know; **CD-** I completely disagree; **PD-** I partially disagree; **N/A-** Neither agree nor disagree; **PA-** I partially agree; **CA-** I completely agree

In Table 3. The results of responses from respondents who have taken antibiotics in the previous 30 days are presented. Approximately 85,3% of respondents completely agree that they took antibiotics as prescribed by a doctor, while a smaller number completely disagree (3,3%), partially disagree (0,7%), and neither agree nor disagree (2,7%). Regarding taking antibiotics according to the instructions received in the antibiotic package, 52% of respondents completely agree, while 20% partially agree. About 76% of respondents completely agree that they read the expiration date on the antibiotic package, while a larger number also hold the

opinion that they completely disagree with the given statement (10%). Regarding receiving antibiotics exclusively according to the instructions of their general practitioners, 73,8% of respondents (110) completely agreed, while a smaller number of 13,4% (20 respondents) hold a different opinion, while the largest number, 89,9% of respondents (134), completely disagree that they obtained antibiotics from their friends/family members, with a smaller number of respondents expressing slightly different opinions: 4% neither agree nor disagree, 3,4% partially agree, and 2% completely-agree

Table 3. Antibiotic use in the previous 30 days according to respondents' answer

| | IDK | CD | PD | N/A | PA | CA |
|--|-----------|-------------|-----------|------------|-------------|--------------|
| <i>I took antibiotics as prescribed by a doctor</i> | 0 0,0% | 5 3,3% | 1 0,7% | 4 2,7% | 12 8,0% | 128 85,3% |
| <i>I took antibiotics according to the instructions received in the antibiotic package</i> | 0 0,0% | 24 16,0% | 4 2,7% | 14 9,3% | 30 20,0% | 78 52,0% |
| <i>I checked the expiration date on the antibiotic packaging</i> | 0 0,0% | 15 10,0% | 4 2,7% | 6 4,0% | 11 7,3% | 114 76,0% |
| <i>I obtained antibiotics on a prescription from my general</i> | 0 | 20 | 2 | 7 | 10 | 110 |

| | | | | | | |
|--|------|-------|------|------|------|-------|
| practitioner | 0,0% | 13,4% | 1,3% | 4,7% | 6,7% | 73,8% |
| I obtained antibiotics from a friend/family member | 0 | 134 | 1 | 6 | 5 | 3 |
| | 0,0% | 89,9% | 0,7% | 4,0% | 3,4% | 2,0% |

IDK- I don't know; CD- I completely disagree; PD- I partially disagree; N/A- Neither agree nor disagree; PA- I partially agree; CA- I completely agree

Discussion:-

Antibiotics represent preparations capable of destroying bacteria or inhibiting their colonization. Today, antibiotics are also referred to as antibacterial or antimicrobial drugs, essentially all being antibiotics with variations in their mechanisms of action and chemical structures. Numerous literary sources discuss the knowledge and use of antibiotics among students of related professions, such as medical, dental, and natural sciences. According to Glavaš (2021), undergraduate students from various fields, including medical, expressed their opinions, knowledge, and handling of antibiotics. Out of 731 students surveyed, a staggering 40.2% had taken antibiotics without a prescription in the last 6 months. Moreover, over half of the students (56.5%) stored antibiotics past their expiration dates. During self-administration of antibiotics, approximately 16.7% of students experienced adverse effects, while 30.6% used antibiotics for minor ailments like the common cold. Additionally, Pilipović (2022) stated in their study that about 64% of dental faculty respondents had used antibiotics in the past year, with 50% having done so one to two times. A significant proportion (74%) of respondents correctly answered questions regarding antibiotic use, yet a concerning 15% of students self-medicated with antibiotics, often due to high fever. According to the literature cited in the study by Di Gennaro et al. (2020), medical faculty students (studying medicine, nursing, health professions, and dental medicine) were surveyed regarding antibiotic use and knowledge. Among the 1050 students surveyed, around 20% believed antibiotics could treat viral infections, while 15% stated they stopped taking antibiotics when their illness symptoms began to diminish. This study revealed that women were more likely to take antibiotics only when prescribed by a doctor, while students with family members working in healthcare were more prone to taking non-prescribed antibiotics. Based on the discussion of the data and research findings, it is evident that there is insufficient discourse about antibiotics, and knowledge and

usage of antibiotics are low, both among students not in the healthcare domain and others. There is a need for greater education among students regarding the significance of antibiotic use, its consumption, and potential contraindications.

References:-

- [1] Di Gennaro, F., Marotta, C., Amicone, M., Bavaro, D. F., Bernaudo, F., Frisicale, E. M., Fantoni, M. (2020). Italian young doctors' knowledge, attitudes and practices on antibiotic use and resistance: A national cross-sectional survey. *Journal of Global Antimicrobial Resistance*, 23, 167-173.
- [2] Glavaš, M. (2021). *Znanje i Stavovi Medicinskih Sestara/Tehničara i Studenata Sestrinstva o Antibioticima i Otpornosti na Antibiotike* (Doctoral dissertation, University North. University centre Varaždin. Department of Nursing).
- [3] Higueta-Gutiérrez, L. F., Roncancio Villamil, G. E., & Jiménez Quiceno, J. N. (2020). Knowledge, attitude, and practice regarding antibiotic use and resistance among medical students in Colombia: A cross-sectional descriptive study. *BMC Public Health*, 20, 1-12.
- [4] Kutlesic, N., Jovanovic, A. (2020). Knowledge and Habits Towards Antibiotic Use and Resistance of Public University Students in Nisava Region–Southern Serbia. *Reinvention: an International Journal of Undergraduate Research*, 13(2).
- [5] Nogueira-Uzal, N., Zapata-Cachafeiro, M., Vázquez-Cancela, O., López-Durán, A., Herdeiro, M. T., Figueiras, A. (2020). Does the problem begin at the beginning? Medical students' knowledge and beliefs regarding antibiotics and resistance: a systematic review. *Antimicrobial Resistance and Infection Control*, 9, 1-16.

- [6] Pilipović, N. (2022). *Usporedna Studija Znanja o Antibioticima Među Studentima Stomatoloških Fakulteta u Zagrebu i Beogradu* (Doctoral dissertation, University of Zagreb. School of Dental Medicine. Chair of Pharmacology).
- [7] Shahpawee, N. S., Chaw, L. L., Muharram, S. H., Goh, H. P., Hussain, Z., Ming, L. C. (2020). University students' antibiotic use and knowledge of antimicrobial resistance: what are the common myths?. *Antibiotics*, 9(6), 349.



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