Evaluation of students' knowledge at Nalut Medical Technology College concerning misusing of antibiotics and its consequence

Dr. Aiman Abdallah Alazzabi , Dr.Said E Wreg
Dept. of Medical Laboratory, Faculty of Medical Technology
Aljabal Algharbi University

Abstract:

The aim of this research is to evaluate the knowledge of students at medical technology college in Nalut about the risky implications of improper and misuse of antibiotics which may contribute to the emergence of new bacterial antibiotic resistance strains that can lead to increased morbidity and mortality in the society especially in the hospital setting.

Surveillance questionnaire study involved in total, 100 students

(81 female&19 male-age limit[19-23y]) were randomly selected and interviewed on their altitude towards knowing the term antibiotic resistance, disease or infection they use antibiotic to treat, effectiveness of antibiotic on bacteria or viruses, whether they complete the required antibiotic course even if they get better. Have they bought antibiotics without prescription; have they used remained antibiotics from their family in the past to treat similar infection and other questions that assess the comprehension of students to proper use of antibiotics or not.

The study indicates that there is a firm association between an underestimated practice by the physicians of giving instructions and advises about the correct procedure to take antibiotics, negligence by the pharmacists in providing patients antibiotics without prescriptions. lack of knowledge by students of how to take antibiotics in accurate ways. Together, these factors contribute to an increase in the emergence of new bacterial antibiotic resistant strains. 41% of surveyed students thought that antibiotics can be used to treat viral infection such as influenza and the common cold. 80 % of students answered yes when they recover from an infection after treatment they immediately stop the antibiotic course prescribed even in three days only. 54% of students take amoxicillin compared with 22% would take amoxil, 10% use Julmentin and 7% use Augmentin without prescription. Medical educational programs that instruct students, physicians and pharmacists about the risky of irrational use of antibiotics must be implemented. Antibiotics must be given under control and supervision. Leaving these instructions not regulated will enhance the chance of existence of antibiotics resistant bacteria.

Figures in this study show a number of factors that contribute to increased level of antibiotic resistance among selected samples of students. There should be strict regulation laid down by the local authority

about prescription polices , control and implementation of firm guidelines to pharmacists working in healthcare Centre's and in the private health sector and in the community.

Key words:*antibiotic resistance, misdiagnoses, infection, emergence, morbidity, self-medication, bacterial mutation.*

1.Introduction:

For the past eighty years, antibiotic therapy has played a major role in the treatment of bacterial infectious disease. Since the discovery of penicillin in 1928 by Fleming and Sulfanilamide and in 1934 by Domagk, the entire world has benefited from one of the greatest medical advancements in the history (Mital *et.al* 2015).Death that occurs as consequence of infectious disease was decreased, and life expectancy has increased since the discovery and extensive using of antibiotics and vaccines. Scientists were hoping that after application of antibiotic, infectious disease will be eradicated. However, this hopefulness did not come true because of emergence of new infectious disease that has become resistance to antibiotics and start to widespread in the entire world.(Andre *et al.* 2014).The first cases of antibiotic resistance was noted after world war II which was a penicillin resistance among gonococci and staphylococcal strains. Afterword's, in 1970 other cases of resistance were reported which was Methicillin-Resistant *Staphylococcus aureus* MRSA

(Abdel-Maksoud *et al*. 2016). likewise, after prescribing and widespread using of gentamicin, cases of aminoglycoside-resistant *Pseudomonas aeruginosa* were noticed(Biswal*et al.*2014). Moreover, back 10 years ago, penicillin resistance in *Streptococcus pneumonia* was increased (Goldstein et al.1999). Lastly, new

cases was reported to resist macrolides, doxycycline and cephalosporin's and continue to be increased in the near future(Criswell *et al.* 2015). According to the world Health Organization(WHO) ten countries have reported strains that are resistant to all currently available forms of antibiotic treatment, if cases persist and resistance continue to rise; some reports estimate that by 2050(Chin *et al.* 2015). there will be ten million antimicrobial resistance-related deaths worldwide. According to WHO reports, gonorrhea can become soon untreatable.

Centre for Disease Control(CDC) estimated that about 480.000 cases of multidrug resistant tuberculosis will spread in the entire world by 2013 (Tavernise *et al.* 2013). Because of emergence of antibiotic resistant bacteria, drug choice to be prescribed to suitable patients become not effective, limited, expensive and useless

(Ryan *et al.*2013). Lifesaving procedure for instance, organ transplants, chemotherapy, dialysis and caesarian section will become life threatening

(CDC 2013). Furthermore, development of bacterial resistance can rapidly cause morbidity and mortality of infectious disease especially for cases that need a longer hospital stay(Stein *et al.* 2015). as a result of that new effective antibiotic to treat and prevent infection is required.

Method:

In this study, questionnaire survey was done using nine questionnaire format covering a sample of one hundred students with the age(limit19-23y) involving19 male students and 81 female students at Nalut Medical Technology College. These questionnaires ,were used as face to face interview questions. The questionnaires were designed to cover information on familiarity with antibiotic resistance term, the most antibiotics taken

without prescription, diseases that the most antibiotic used by students to treat, whether physician give necessary advise or not, using same antibiotic to treat new infection, stop taking antibiotic once recovering, and what to do after completing antibiotic treatment and same symptoms come back again.

Results:

This current study points out that gaps in understanding how does antibiotic resistance phenomenon occur make people confused about how to prevent it from growing and this contribute to emergence of major threat to public health. The objective of this study is critical attempt to improve understanding about antibiotic resistance. The research finding will guide in contriving health educational program for students to improve their knowledge regarding antibiotic resistance and take suitable precaution to avoid it. The questionnaire questions were designed as following.

Antibiotic resistance terminology:

43% of study sample have known the term antibiotic resistance; they said they recognized this term through lectures they have attended at college, and form what they watched on TV, scientific magazine, and internet network. However, when they are asked whether they know the reason that makes the bacteria becomes resistance to antibiotic; they answered by that they have never known or heard by chance about what render this bacteria to develop resistance against some antibiotics.57% of students answered that they have never heard about the term antibiotic resistance nor they have known about the causes of this phenomena which makes bacteria become aggressive and do not respond to treatment by some antibiotic. Having not heard about the antibiotic resistance and causes of it

will complicate and make the infection by bacteria become severe since some patients are not familiar with their infection. As result, they will look for any type of antibiotic to treat their infection which instead diminish the symptoms will exaggerate the infection and might not the respond to any available antibiotic treatment. figure.1

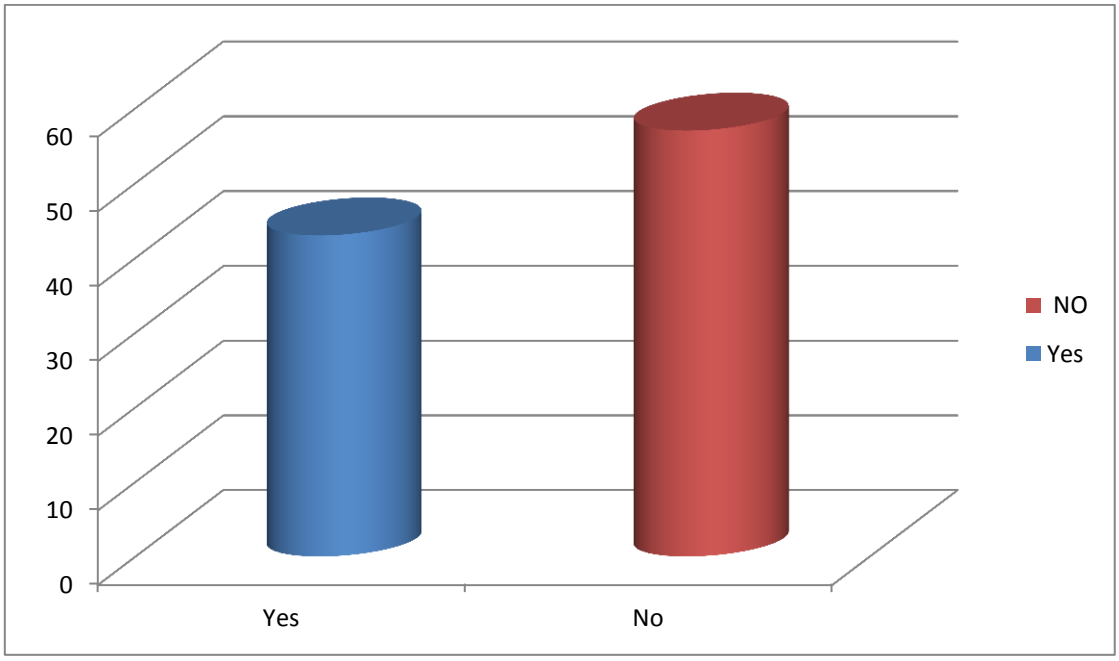

Figure 1: Shows Familiarity with the antibiotic resistance terminology

Antibiotics consumption without medical prescription:

The most common antibiotics that are taken by students are respectively: 54% of study sample used amoxicillin as drug choice for treating their infectious disease. 22% of them used amoxil, 10% of student used Augmentin, 7% of them used Augmentin, 4% used Zithromax, 2% of student used Ceclor and 1% used zinoximor. When the interviewed students were asked whether they were given these antibiotics by physician

or pharmacist, their answers were that they did not use prescription to order antibiotics; they just rely on their knowledge to purchase these antibiotics. Surprisingly, the pharmacist did not preclude to offer these medication for these students. figure.2

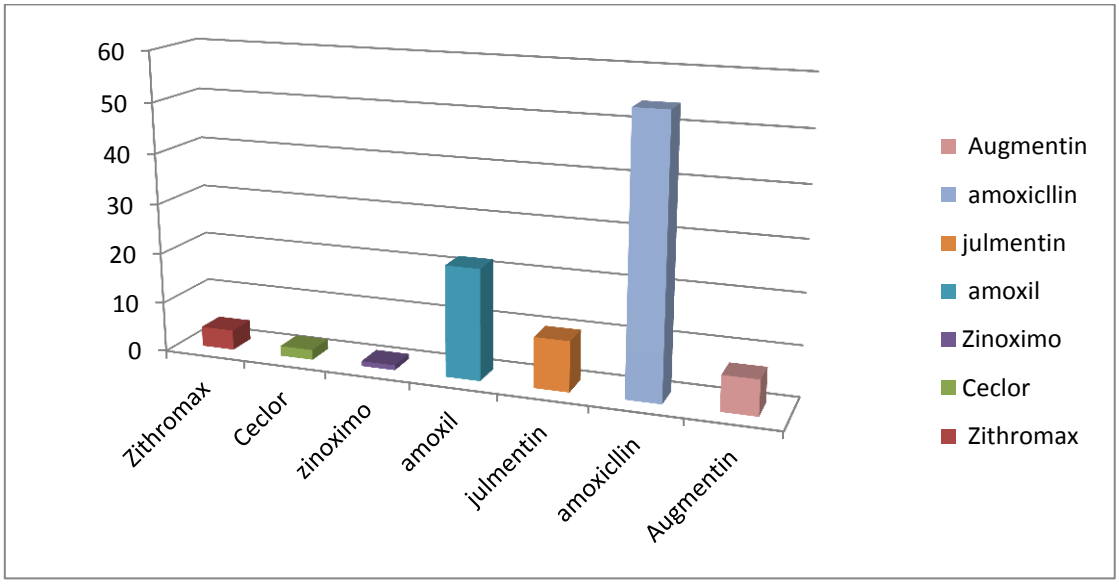

Figure 2: Shows the most antibiotics used without medical prescription

Common diseases that students use antibiotics to treat:

41% of the study sample used antibiotic to treat influenza which is a viral infection not a bacterial infection. in this case this antibiotic is ineffective and will not kill virus because virus has different structure and replicate in different way than bacteria.

18% and 3% of students used antibiotics to treat sore throat and tonsillitis respectively, which are mostly not prescribed nor administered by doctors. The two infections are mostly caused by viruses, so without tests we cannot confirm if the case is a bacterial infection. Antibiotics cannot kill viruses but can lead to bacterial selection for antibiotics as such

doctors prefer to let the immune system clears these infections within a few days.8% of students used antibiotics to treat otitis media, the treatment must be under supervision by doctors and antibiotic should not be taken as self-medication by patients because of increased cases of drug resistant *Streptococcuspneumonia*. 16%, 7% and 7% of students used antibiotic to treat common cold, urinary tract infection and coughing. It has been known that the causative agent of common cold is mainly viruses, so taking antibiotics to treat this infection will lead to a risk consequence which is getting infection that is resistance to antibiotics. figure.3

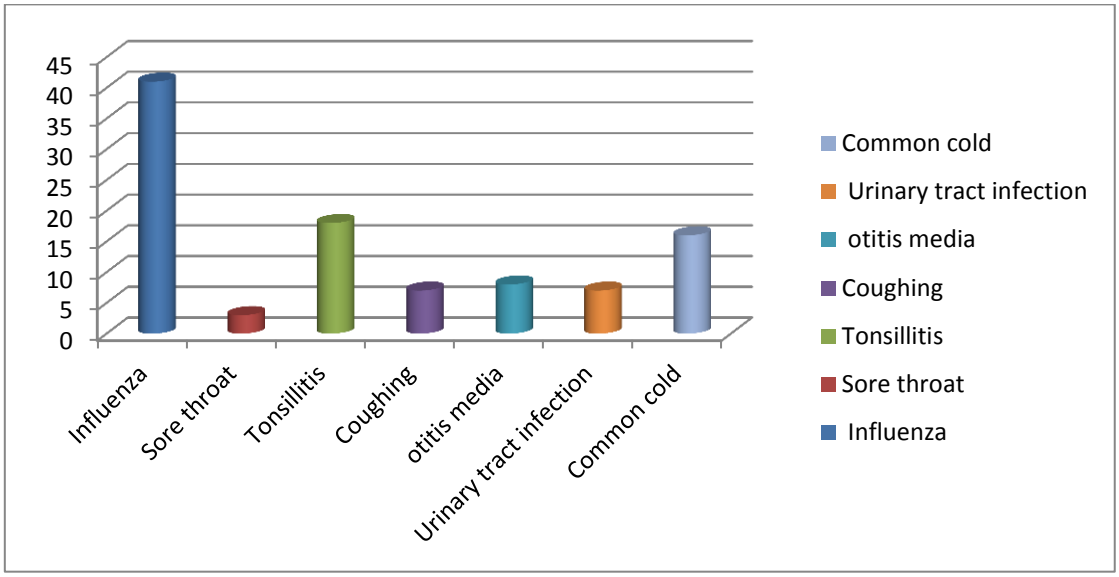

Figure3: Shows most common diseases that students use antibiotics to treat.

Use and abuse of antibiotics and its effect on normal flora:

48% of study sample do not even know if there are a normal flora which are found in different places in our body and protect us from different disease by competing with invaders for space and nutrients, produces bacteriocins compound which kill other bacteria and lower the pH

so other bacteria will not grow. So, inappropriate use of antibiotic will kill normal flora and jeopardize the body to be colonized by pathogenic bacteria and this bacteria will grow on and develop resistance to commonly administered antibiotics.39% of students know the risk of irrational use of antibiotics, that has affect negatively on normal flora that live in large intestine such as *E.Coli*.13% of students do not know the complication and risk for using antibiotic in irrational way and its effect on normal flora. figure4.

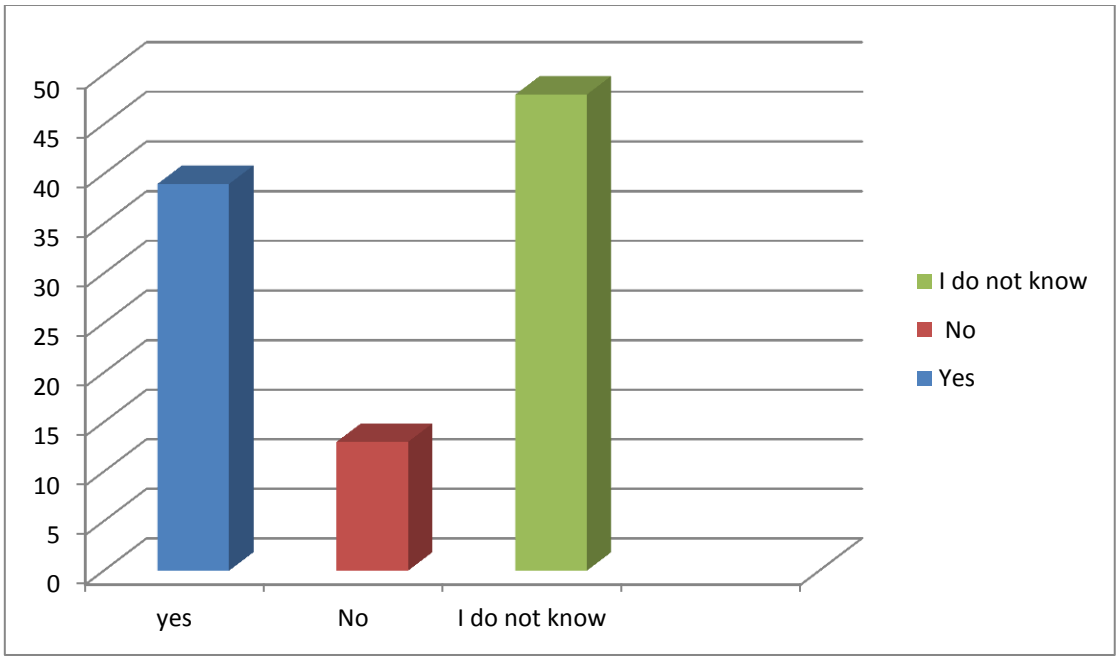

Figure4 : Shows misusing of antibiotic and its effect on normal flora

Consumption of previous prescribed antibiotics to treat current infection:

56%of study sample have used the same antibiotics that had been prescribed by physician to their family, they used these antibiotics

whenever they noticed the same symptoms that appeared on somebody of their family, they usually do not consult doctors nor conduct test to determine the type of infection they had to use specific antibiotic. This irrational use of these antibiotic will exaggerate their infection and my increase resistance of bacterial infection to this type of antibiotics instead of treating the infection.38%of students stated that whenever they get Infection and had same symptoms ; they do not use the same antibiotic that have prescribed to their family. They visit physician and are given specific antibiotic based on their diagnosis. figure5.

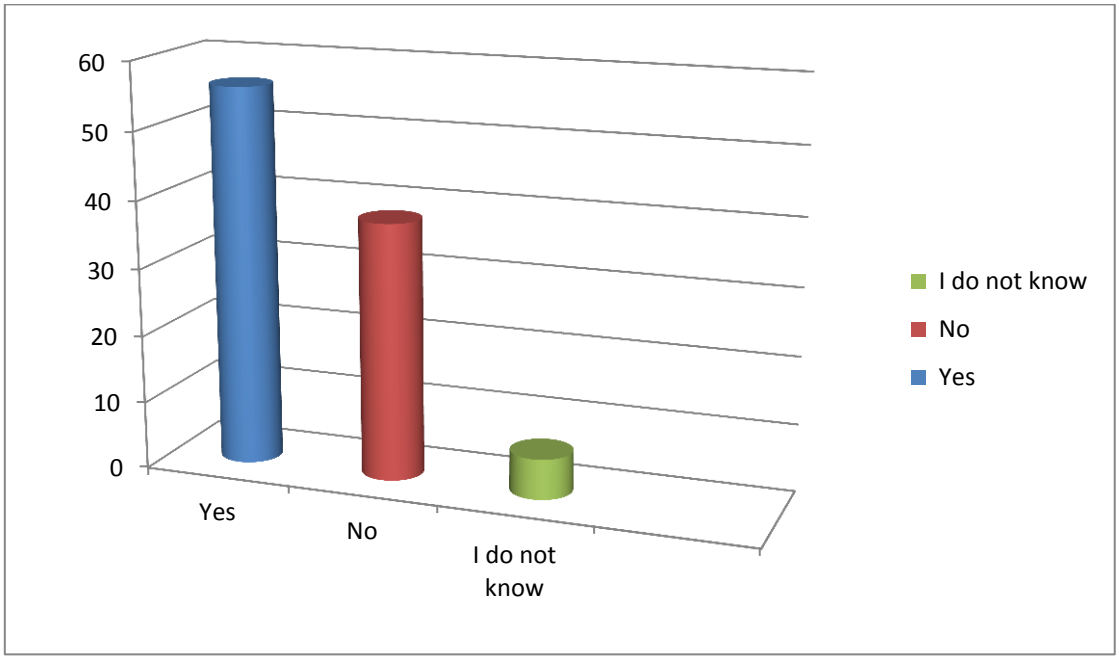

Figure 5: Shows using old prescribed antibiotic to treat current infection.

Termination of antibiotic treatment after recovery from infection:

80% of students answered that they stop taking antibiotics immediately after disappearance of symptoms; they believe that it is not wise decision continuing taking antibiotics while symptoms are improved.16%of students answered that they follow the instruction told by their physician and have not stopped taking antibiotics until the antibiotic course is finished. figure6.

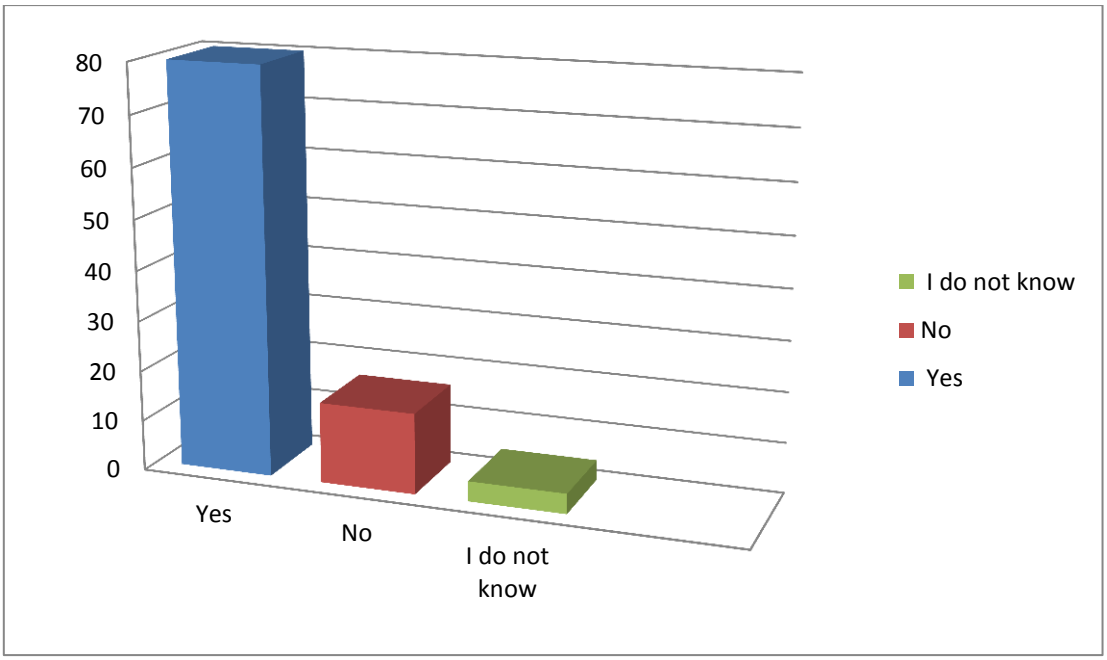

Figure 6: Shows termination antibiotic treatment after recovery from infection.

Antibiotics issued from pharmacies without prescription:

63%of students do not rely on prescription when they purchase antibiotics from the pharmacy; they said that the majority of pharmacist do ask for prescription, they only give antibiotics based on symptoms that are

being told by patients or by showing old box that is previously taken by patients for earlier infection. Uncontrolled providing patients with un-prescribed antibiotics from pharmacist will increase the emergence of bacterial resistance since antibiotics are given in irrational way which contribute to wide spreading of antibiotic resistance. Because these bacteria can be transmitted from person to person and soon will be untreatable by current antibiotics.31%of students said that they do not buy antibiotics without prescription that had been written by doctor; they do not ask pharmacists unless they showed prescription to them and make sure that the antibiotic that is given to them is exactly what has been written by consulting doctor again. figure7.

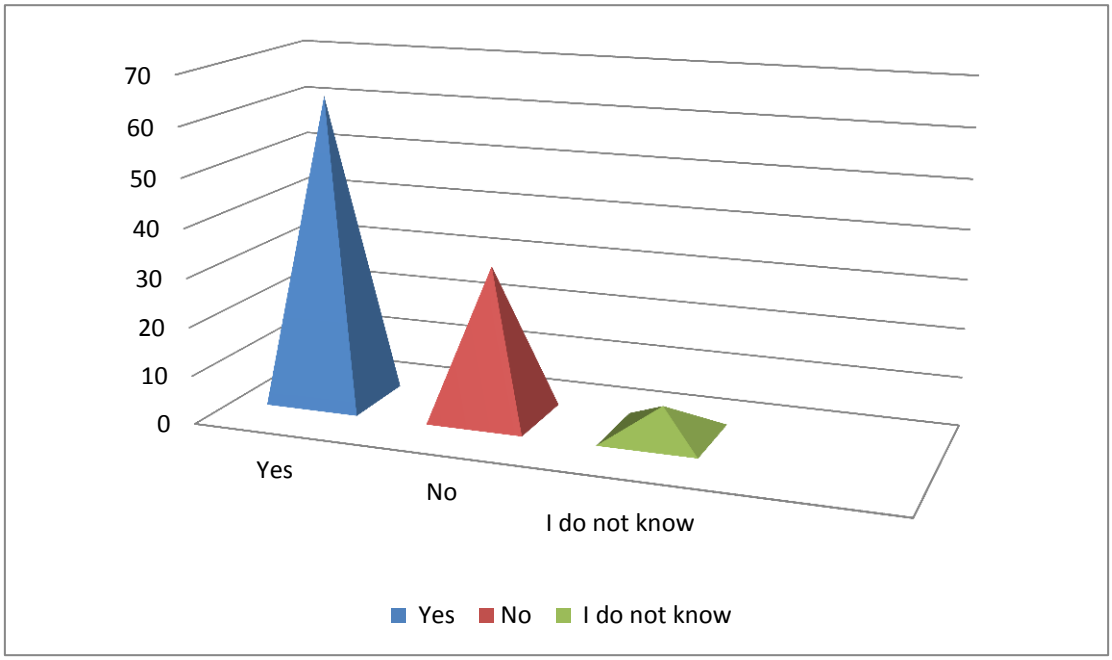

Figure 7: Shows buying antibiotics from pharmacies without prescription

Factors that make students take antibiotic without prescription:

67% of students believe that the main reason makes them decide buying antibiotic is the easy access to get it from different pharmacies that are distributed around the city. There is no control nor surveillance on pharmacist qualification, the majority of pharmacists who work in the pharmacy are not qualified; they are not even graduated from pharmacy college. They rely on the names of medications just by experience that comes from working for long period of time, they give the antibiotics based on the patients need; they give any type of antibiotic requested by patients. 21%of students think that the reason that make them decide buying antibiotic is because of delaying appointment in government hospital; crowdedness of patients in front of hospital departments prevent patients from coming and visit doctors to proper diagnoses and issue the appropriate antibiotics. As a result, patients would seek another alternative choice to get any antibiotics that could ease the severity of their symptoms.9%of students consider that the reason that make them decide to buy antibiotics is because they cannot afford the expenses of medical examination and medical analysis that determine the type of infection and assign specific antibiotics; invoices are too expensive in private hospitals. So, they prefer to buy antibiotics from pharmacy.3%of students assume that the suitable price for antibiotic is what makes them buy antibiotics, they think that they should keep many antibiotics in their refrigerator until they need them in case they get infection; they do this because they believe the price of antibiotics is cheaper than other medication. figure8.

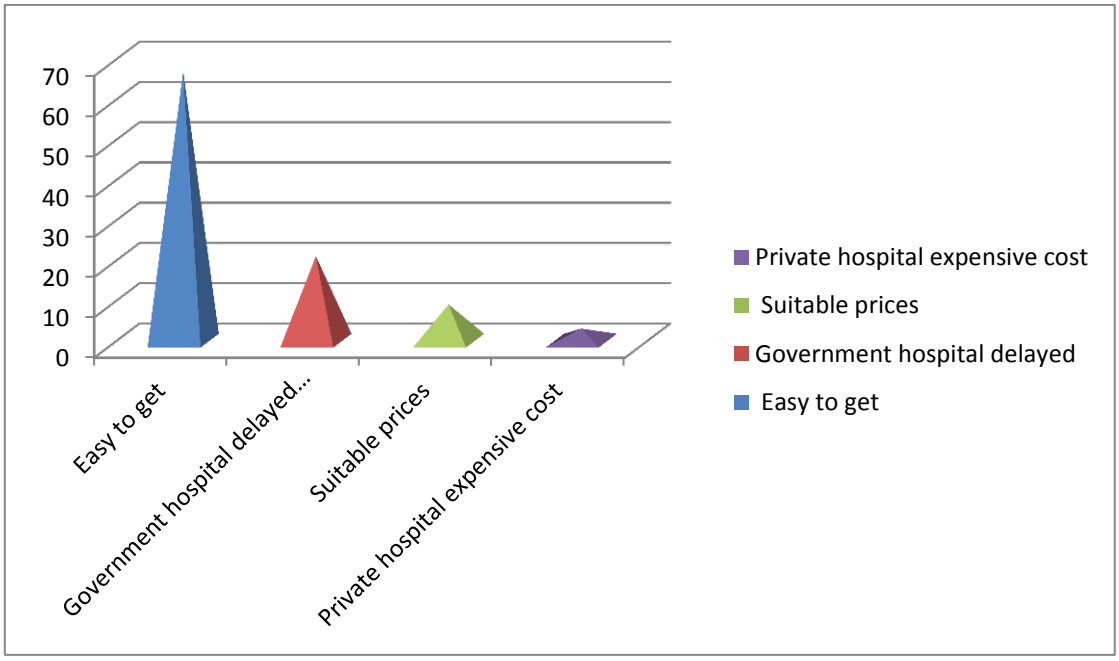

Figure8: Shows reasons that make students buy antibiotic without prescription.

when symptoms worsen after antibiotic treatment ;what do students do?

54%of students believe that after completing antibiotic courses that had been prescribed by physician and noticed that they experience same previous symptoms which becomes worse now, they said that they act immediately by taking a new other types of antibiotics without consulting doctor, thinking that these alternative antibiotics would ease the symptoms.28%of students think that in case they feel uncomfortable and their symptoms become worse; they visit hospital and ask the physician to increase previous dosage or change the antibiotic.18% of students consider that if symptoms do not disappear after completing antibiotic course and increase in severity, they go to pharmacist and request same antibiotics. figure9 .

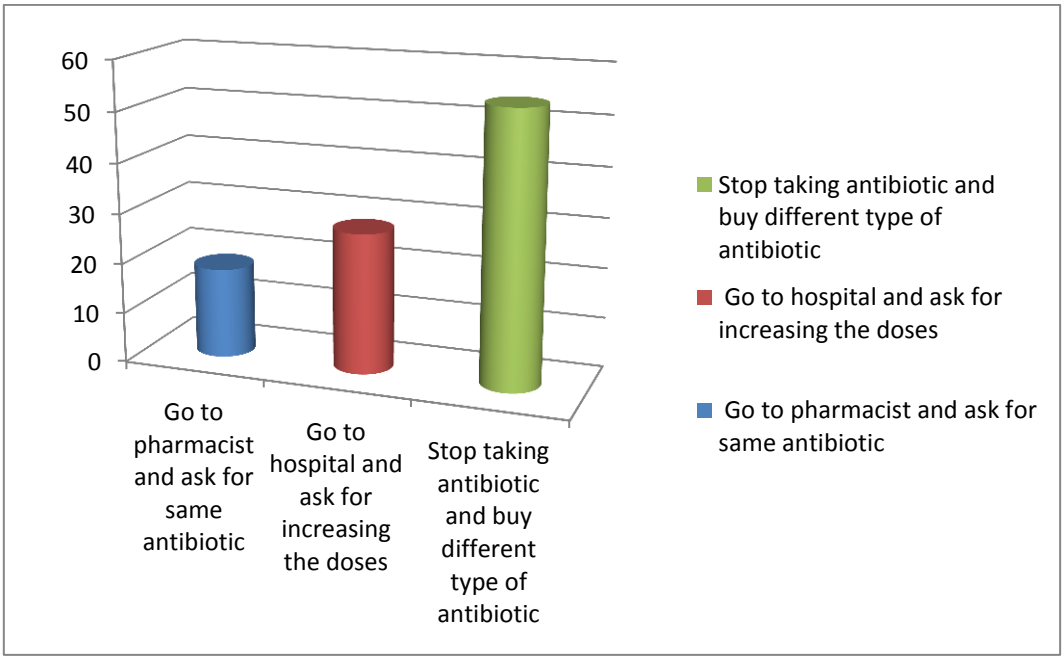

Figure 9: Shows what students do when symptoms worsen after antibiotic treatment.

Discussion:

This current study reveals that lack of health knowledge increases the risk of antibiotic resistance as statistics obtained from the survey showed that 57% of students have not realized the causes of antibiotic resistance nor antibiotic resistance what implies. Lacking of awareness of the factors that contribute to make bacteria mutate to become resistant, leads to an increase in the inappropriate using of antibiotics because they have a misunderstanding that taking too much antibiotics even without prescription will not affect the body; they take excessive amount of antibiotics believing that high doses of antibiotics will kill bacteria faster. However, unnecessary antibiotics doses will not kill entire bacteria, instead

it makes it selective for antibiotics. These results are consistent with previous findings

(Wareg *et al*.2014).This study observed that 41%of students believe that antibiotic can be used to treat viral infection such as influenza and common cold which is a higher percentage indicating poor health education in the society. They explained that they do not hesitate to take antibiotics to treat their infection where the exact medical diagnosis is not there which determines the exact causative agent of antibiotic resistance. Taking antibiotic in this case will not kill viruses. On the other hand, this lead to bacterial selection for antibiotic resistance and establish infection. Survived bacteria will resist if the same antibiotics are to be taken in the future. Some bacteria such as drug-resistant *Streptococcus pneumonia* shows decreased susceptibility to penicillin, doctors usually prescribe amoxicillin as drug of choice to treat infection caused by this bacteria. However, using antibiotics such as penicillin and its derivatives will lead to increase antibiotic resistance.

Similarly, because of misinformation, 48%of students do not realize that overuse and increased dose of antibiotic will kill normal flora, such as *E.coli* bacteria which benefit our bodies by producing vitamin K2, and co-factor of our body to be colonized by pathogenic bacteria which may create antibiotic resistance. likewise, patients may misuse antibiotic this happen as this study shows 56%of students have used same antibiotics that had been prescribed to some member of their family when they felt that they experience same symptoms thinking that these antibiotic would kill the infectious agent responsible for causing their symptoms. Surprisingly 80% of students stop taking antibiotics that had been prescribed by physician instantly once they recover from infection; If the treatment is stopped before the time the doctor has allocated, there is a risk that antibiotic would

not have killed all bacteria instead render them mutated and become resistance to antibiotics prescribed. Students are not aware of unsafe using of antibiotics. 63%of students never depend on prescription when buying antibiotics from private pharmacies, because pharmacists use their own experience in knowing some symptoms of disease to diagnose infection, as a consequence, patients go directly to pharmacists to buy antibiotics regardless of importance's to consult with the physician as we have noticed that 67% of students just buy antibiotics because of its easy access at any pharmacies scattered in the area, knowing that some pharmacists may not ask for prescription. They sell antibiotics whenever patients ask for it, there is no critical awareness care about the exact type or the amount of antibiotics which may affect the patient. As a consequence, bacteria that causes infection will develop resistance because of overusing and misusing of antibiotics that are given by unqualified pharmacist. Students more often do not count on physician nor pharmacists to get information about medication, as this research come up with that students depend on themselves to buy antibiotic from pharmacists as this study found that 54%of students when their antibiotic course that had been prescribed by physician has finished and they noticed that the infection instead of being recovered becomes deteriorated; they immediately go to pharmacist to buy a new antibiotics without consulting of doctors nor pharmacist give advises or mind in selling antibiotics. All of these procedures in excessive selling and using antibiotics without the approve of physician will lead to severe crisis in the society by exploding of new bacteria that might resist all types of antibiotics that are used.

Conclusion:

The most successful means in improving students' knowledge on antibiotics resistance is by health education to limit taking unnecessary antibiotics. In case, they experience severe symptoms and suspect the infection is due to bacteria; the infection must be confirmed by diagnosis to determine the causative agent responsible for infection and assign suitable antibiotics. To prevent antibiotics resistance, students must comply with physician consulting and never terminate treatment allocated unless antibiotics given are completed. Pharmacists must restrict giving antibiotics without prescription and food producing animals must control adding excessive amount of antibiotics to food that are supplied to chickens or other animal products which may be one of factors that contribute to increased bacterial resistance. There should be strict regulation laid down by the local authority about prescription polices and control and implementation of firm guidelines to pharmacists working in healthcare Centre's and in the private health sector and in the community.

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Survey questionnaire:

Q1. Have you ever heard about antibiotic resistance?

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Q2.Which of these antibiotics have you ever used most without medical prescription?

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Q3.which of these disease have you ever used antibiotics to treat?

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Q4.Do you know that irrational use of antibiotic can kill normal flora, as such providing an opportunity for drug resistant microorganism to grow vigorously?

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Q5.Have you ever had taken antibiotics to treat your infection which was prescribed by the physician to somebody from your family?

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Q6.Have you stopped taking antibiotics immediately after feeling you get better ?

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Q7. Have you ever bought antibiotics from pharmacy without Prescription

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Q8. In your opinion, what is the reason that makes you buy antibiotic without physicians prescription?

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Q9. Whenever you completed taking antibiotic courses that had been prescribed by physician and you have noticed that the same symptoms back again and becomes more severe, your act would be

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Comments.....