

Bacterial contamination of Iraqi banknotes and antibiotic resistance

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ABSTRACT

The gift observe changed into executed to decide the sort and nature of bacterial contamination of Baghdad / Harthiya Paper currency notes (Dinar) in Circulation, 50 Paper forex notes of different Iraqi dinar organizations from unique locations of Baghdad and different professions. The outcomes of isolation and analysis confirmed the contamination of all samples with micro organism and via a hundred%. 48 bacterial isolates had been isolated from the 50 samples belonging to 10 one of a kind bacterial species, including: Staphylococci aureus, Bacillus spp, Citrobacterspp, Escherichia coli, Protusspp, Enterobacterspp, Klebsiellaspp, Pseudomonasaeruginosa, Streptococcus, Salmonella spp.. All categories of the Iraqi dinar have been contaminated with Bacillus spp. Staphylococci, and the small dinar categories have been more polluted than the huge businesses. The consequences of the study of the sensitivity pattern of contaminated bacterial pathogens of the Iraqi paper for therapeutic antibiotics revealed resistance to a few antibiotics used inside the test in extraordinary proportions.

Keywords: Pathogenic bacteria, antibiotics. Bacterial infection, Iraqi paper foreign money notes

INTRODUCTION

Banknotes and cash in wellknown are widely exchanged and are transmitted among a large number of human beings, inclusive of healthful human beings, including folks that are inquisitive about personal hygiene and people who are not interested. To contaminate these cash, in particular old banknotes and small-denominated cash, which are more often handheld due to the fact they're often used. Compared to coins which are less receptive to contamination, they're also infected while stored in leather, cotton or polythene luggage and baggage in conditions of moisture, sweating and darkness which might be suitable for the increase of pathogenic micro organism, specially the (El-Dars, 2005). When coins are infected with pathogenic microorganisms together with micro organism, fungi and viruses, they are able to act as environmental vectors for diseases because of those pathogens to many sufferers, especially for vulnerable people including patients

and kids (Lamichhane, 2009). In using antihistamines and taking large portions of antihistamines themselves for a long term and without changing urge micro organism to withstand, as well as excessive use without the recommendation of a medical doctor and not whole the essential treatment guides and forestall taking antibiotics when the signs of Improvement at the patient (Ahmad, 2016). Either when touch with infected pores and skin and wounds, arms infected with saliva, nasal secretions or feces, or while contact with infected materials and locations, this means that the money will choose up nurses from the touch environment at some stage in its lengthy adventure from production and garage, and after manufacturing during recycling and conservation till the Destroyed permanently (Ahmed, 2010). Often humans do no longer wash their palms after touching money and most doubt the reality that they'll expand many serious diseases transmitted to them thru the flow of cash,

and accordingly be a currency threat component inherent chance to public fitness and ought to pay attention to it and study and be aware of its dangerous role, especially when it's miles handled Before clinical professionals or employees with meals and forget health situations and no longer washing fingers well before analyzing sufferers or earlier than coping with food and drinks (Sharma, 2011).Consequently, the current examine turned into conducted to come across the possibility of bacterial contamination of the Iraqi foreign money in circulate, and to analyze the sample of sensitivity to antibiotics of the pathogenic bacteria isolates contaminated with the forex and eventually increase the fitness awareness of people throughout the circulate of cash.

MATERIALS AND METHODS

Collect samples

50 samples were amassed from the Iraqi forex paper forex (dinar) and one of a kind categories (250, one thousand, 5000, ten thousand, 25000 dinars) and 10 samples for each cash class all through the duration from the start of January to the give up of April 2017, the samples have been accrued in Baghdad / Al-Harthiya in the foreign exchange market, has been accrued through setting samples in sterile plastic bags and have received in return opportunity banknotes, and then transferred samples at once to the laboratory for bacteriological assessments on them.

Isolation and diagnosis

Each sample changed into positioned in a take a look at tube containing nine mL of nutrient broth (Nutrient broth), the tube changed into shaken nicely for 2 mins, and after incubation of the pattern tubes for 2-4 hours and 37 ° C samples had been removed from the tubes using sterile forceps. The cultivated vaccine was then vaccinated on platters containing non-compulsory and African media inclusive of: Mannitol Salt Agar, Maconkey Agar, Eosin Methylene Blue Agar, and Blood Agar and incubated. The colonies have been identified based totally at the morphological characteristics of the developing colonies, the reaction of cells to biochemical assessments the use of preferred microbiological strategies, and primarily based at

the diagnostic characteristics contained in it (Chess, 2012).

Bacteria sensitivity check for antibiotics

Only the maximum vital pathogenic isolates of people have been decided on Pseudomonasaeruginosa, Escherichia coli, Staphylococcus aureus, Salmonella spp and Klebsiella spp.

This test turned into carried out based totally on (CLSI, 2013) as follows:

The bacterial suspension of the developing bacterial colonies become prepared at the agar nutrient medium by using deciding on five isolated colonies on the nutrient agar medium (Nutrient Agar) and transferred to tubes containing five mL of Mueller-Hinton Broth, incubated at 37 ° C for 4-6 Hours Until the turbidity regarded, a turbidity become acquired corresponding to the turbidity of the standardized McFarland solution (McFarland Tube 0.Five). A sterile cotton swab was submerged within the bacterial suspension and transplanted to the center of the Mueller-Hinton Broth with 3 directions for homogeneous growth, then left at room temperature for 5 mins to absorb the implant and dry the medium. Antibiotic pills the use of sterile forceps, incubated at 37 ° C for 18-24 hours. The Kirby - Bauer disk diffusion approach turned into used for allergy trying out and using the subsequent antibiotic drugs), Chloramphenicol (10^mgg), Gentamycin (10^m g) , Erythromycin (15^m Penicillin (10 U), Aztreoname (30^mg)

RESULTS

Results were measured in millimeter inhibition area diameter round each pill and compared with preferred antibiotic inhibition zone diameter (CLSI, 2013). All samples of the Iraqi dinar (48 samples) have been contaminated with different kinds of micro organism and the fee of infection a hundred% as can be seen from the outcomes of table (1) The general range of bacterial isolates remoted from 50 samples, and isolates of micro organism emoted from the samples include: Staphylococci aurous, Bacillus spp, Citrobacterspp, Escherichia coli, Protusspp, Enterobacterspp, Klebsiellaspp,

Pseudomonasaeruginosa, *Streptococcus*, *Salmonella* spp

Table 1: The results of the presence of bacteria isolated to the banknotes in Iraq

Bacteria	250 Dinar	1000 Dinar	5000 Dinar	10000 Dinar	25000 Dinar
<i>Escherichia coli</i>	+	+	+	+	-
<i>Enterobacterspp</i> spp.	+	+	-	+	-
<i>Citrobacterspp</i>	+	+	+	+	+
<i>Salmonella sp</i>	+	+	+	+	-
<i>Klebsiella spp.</i>	+	+	+	-	+
<i>Protusspp</i>	+	+	+	+	-
<i>Pseudomousaeruginosa</i>	+	+	+	+	+
<i>Staphylococcus aureus</i>	+	+	+	-	-
<i>Bacillus spp</i>	+	+	+	+	+

The presence of bacterial growth = + the loss of bacterial increase = -

The results suggest that the forex is infected by pathogenic micro organism inflicting various diseases consisting of *S. Aureus*, *E. coli* and *Klebsiellaspp* and *Salmonella spp*. The relaxation are considered to be ubiquitous inside the environment and infrequently cause diseases in the wholesome host, but opportunistic micro organism purpose serious infections in hospitals in immunocompromised humans. The outcomes of this take a look at indicate that the small economic classes were greater infected with bacteria than the bigger ones, which shows an inverse relationship among the depreciation of the currency and the increase of bacterial infection. This is the end result of the reality that small companies are frequently used and often traded for in many instances among all monetary lessons in society (Ogbu, 2007). This leads us to the truth that the research was performed in the scope of an important currency exchange area in Harthiya and includes a big population which means more contact. More common currency trading leads to extra pollution. *Bacillus* and *Staphylococci* are expected to be infected because *Bacillus* does no longer have a real reservoir; however spore bacteria that withstand environmental and disinfection elements. Surface contaminant is commonplace and can be transferred to cash whilst placed on dirty surfaces or when it comes into touch with dirty arms or when infected with dirt or dust. *Staphylococci*, even though frequently considered

to be human They can also cause illnesses Sometimes, it's miles a natural flowers of the human and animal frame so that it will be a source of its presence somewhere else. It is found at the skin, nose, mouth and intestines, in addition to in air, water, milk and sewage (Tartona, 2003), as it may be transmitted thru friction. With the skin of the fingers naturally inhabited via those bacteria or whilst contact with arms contaminated with risky spray from the nose and mouth throughout sneezing, cough, speech or saliva used to moisten the palms while counting banknotes, and the fecal contamination of the arms because of now not washing the palms properly after using sanitation No be counted in contamination of Ur These bacteria and other

species belong to the *Enterobacteriaceae* circle of relatives, which are determined naturally in the human intestines. As proven on this take a look at, *E. coli*, *Klebsiella*, *Salmonella*, *Protus*, *Enterobacterspp* and *Citrobacterspp* have been isolated. This take a look at showed a pattern of bacterial infection of banknotes much like that during different research conducted in special countries. The 1992 Oktayremoted: *Staphylococcus epidermidis*, *Staphylococcus aureus*, *Enterococcal*, *Lactobacillus*, and *Shigella flexneri* from one hundred twenty forex notes in flow in Turkey. In 2010, Ahmed and his organization remoted seven bacterial species from a hundred Bangladeshi banknote samples: *E. coli*, *Klebsiella*, *S. Aureus* *Salmonella* and *Bacillus*. These studies lead us to

the reality that money touched by using a huge number of humans and below specific environmental situations can be a source of sickness, and that the money contains pathogenic organisms and function gear to transmit diseases to dealers, consisting of through the opportunity of moving among food and money thru the arms while making ready meals without Hand washing by way of meals handlers after touching contaminated cash exposes their clients to the danger of sickness. Contamination may be transmitted by means of moistening arms with saliva when counting leaves, that's not unusual to many, or when children put money of their mouth, as well as while scientific specialists forget about fitness conditions. Touching infected cash and examining and treating sufferers (Sharma, 2011),

money is a capability danger aspect for public health. The sensitivity test of all wonderful and negative bacterial isolates of Cram antibiotic was finished by tablet primarily based on the measurement of the inhibition diameter in millimeters (mm) surrounding the used antibiotic drugs and compared with the standard inhibition tablets contained in (CLSI, 2013). The Iraqi banknotes of antibiotics are proof against some of the antibiotics used inside the check in exclusive proportions (table 3.2), were proof against penicillin and gentamycin Meropenem and anti Impenem for bacterial isolates negative gram which is Escherichia coli, Pseudomonas Klebsiella spp., and Salmonella spp., there was no resistance to gentamycin except Pseudomonas aeruginosa.

Table 2: Names, symbols and concentrations of antibiotics and diameters of standard inhibition zones in mm (CLSI, 2013)

Diameter of damping circle (mm)			Concentration of antibiotic Mg / Disk	Antibiotics
resistant	Average	sensitive		
18	19-24	25	10/10	Ampicillin/Sulbactam
16	17-21	22	25	Ampicillin
12	13-14	15	10	Gentamicin
28	33-29	34	10	Meropenem
26	31-27	32	10	Impenem

The emergence of resistance to typically used antibodies in monoclonal infected bacterial isolates, recognized to be chargeable for many infections within the health facility network of healthful human beings consisting of *S. aureus*, *P. aeruginosa* and *Klebsiella*, makes it dangerous to infect the forex, making them Currency is an infectious device (fomite) that plays an important position inside the transmission and dissemination of drug-resistant bacteria in society which can be tough to deal with. Currency infection with antibiotic-resistant bacteria isolates has been tested in different studies, with the isolation of Oyero and Emikpe for 2007 with the aid of *Enterobacter* spp. and *Klebsiella* spp., *Protus* and *Staphylococcus* spp. As a pathogen immune to tetracycline, cotrimoxazole, and sensitive to the amoxoptin and gentamycin of the Nigerian currency, it suggests that it could be transmitted to the network. The consequences

had been near the take a look at of the researcher (Yaseen, 2014), which found that the proportion of bacterial resistance to the anti-Ampicillin became one hundred% and our results concurred with the equal look at of the anti-gentamycin. It is to check This take a look at targets to improve the personal fitness recognition by washing fingers after touching or to address money with attention to the fact that infected hands way infected currency make contributions to the switch of illnesses from one individual to another, and no longer to eat meals after touching cash, and avoid the usage of saliva while counting cash, We also recommend to the government to re-sterilize grimy and vintage foreign money after which recycle it to lessen the risk of injury inside the community, and the improvement of the foreign money industry, mainly paper money by means of adding

antimicrobial markers in the uncooked material manufacturing.

Table 3: Nature of the resistance of antibiotic contaminated pathogenic isolates of banknotes in Iraq

Imipenem	Meropenem	Gentamycin	Ampicillin	Ampicillin Sulbactam	Bacteria
S	S	S	R	R	Staphylococcus aureus
S	S	R	R	R	Pseudomonas aeruginosa
S	S	S	R	R	Escherichia coli
S	S	S	R	R	Salmonella sp
S	S	S	R	R	Klebsiella spp

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