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ORIGINAL ARTICLE

Screening Antibacterial Activity of Vinegar & Olive Oil on Enteric Bacteria

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ABSTRACT

Food-borne infection is the health problem related to food borne diseases. The majority of reported food-borne disease outbreak was caused by pathogenic bacteria. The important handling & uncooked or raw foods are risk of contamination which is unfit for human consumption & leads to food-borne infection. In the present study, the antimicrobial activity of olive oil & vinegar has been suggested that both the natural preservatives were effective & shown effective bacterial reduction & used as an inhibitors of food-borne pathogens. In this study we screened the chicken meat samples. The isolated micro-organisms were *E. coli*, Klebsiella, Salmonella & Shigella. Further antimicrobial activity of olive oil & vinegar were screened against these micro-organisms from our findings, it's suggested that both the natural preservatives were effective & shown effective bacterial reduction & used as a inhibitors of food-borne pathogens. The growth of bacterial isolates was inhibited by vinegar. The vinegar & olive oil both exhibited a broad range of antimicrobial activity tested by agar-well diffusion methods & zone of inhibitions (mm) were then measured. Antibiotics sensitivity test against these microbial isolates compared with Gentamicin, Nalidixic acid & Chloramphenicol. These compounds therefore possess potential to be used as food bio-preservatives.

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Introduction

About 90% of the foods borne diseases are as the result of enteric pathogens. The innovation of poultry farms & unhygienic conditions of poultry products have played a role in disease, number of different bacterial strains being isolated from trade poultry products from different period of time (1) Incidence of Salmonella in poultry products has been reported in different areas from put on the market exit, retail markets & processing plants (2). The incidence of intoxification of food is due to eating food having bacterial growth, toxins that can cause illness. These toxins do not alter the physical properties of food (3) Food borne pathogens namely *Staphyloccocus aureus* & *Clostridium botulinum*. In C. perfringens, disease caused by the consumption of toxin food that contain a numbers of bacterial cell cells (4). The Enterobacteriaceae are a movable collection of gram negative rods that can infect the GI system in humans & animals. Although they hold in common their capacity to infect the GI system, a variety of species can infect other organs & cause significant pathology. Additionally, enterobacteriaceae produce a wide variety of powerful exotoxins (5). Food safety techniques related to hygenic conditions contamination in Salmonella & *Escherichia coli*, are the two most essential enteric pathogens involved in poultry products (6). Ampicillin showed resistance to be the most common in followed by the number of antibiotics (7). Number of poultry products have been recognized as a source of Shiga Toxin-producing *Escherichia coli* (STEC) during manufacturing process ,these products may contaminated either at the time of slaughtering , handling

(e.g. via unhygienic conditions of food handlers) (8). This is the main clinical sign of Shigellosis & is largely caused by Shiga-toxin induced enterocyte cell death as well as inflammation of the GI mucosa in response to infection (6). The resultant infectious diarrhea involve an incubation of several days, is initially watery with little blood or pus, may be accompanied by abdominal pain & fever (9). Storages of poultry products: The prevent can be accompanied by making standard procedures for preservation of poultry products apart from other foods, mainly uncooked foods. There should be the use of sterile containers like bags in order to prevent uncooked juices soaked to the skin on other foods products (10). The random use of antibiotics should be monitored as these will immediately lose their effectiveness against micro-organisms mainly against as *Escherichia coli* obtain multidrug resistance earlier than other bacteria due to their genetic variation .The use of natural and synthetic products has been increased considerably as the antimicrobial resistance enhanced day by day. In this case, Olive oil and vinegar have been used as a source of food preservation & shows high inhibitory effects against enteric bacteria due to the presence of huge amount of poly phenolic compounds (11). There should be standard food preservation & packaging technologies which help to reduce the interaction of microbes with the food products in future. The epidemic of food borne diseases is important public health issues now a days. The objective of this work is to evaluate poultry products for the enteric bacteria & inhibitory effects of preservatives on the reduction of that microbe (12)

Materials and Method

Sample Collections: About 10 Chicken samples (minced meat) are collected from different local markets.

Enrichment: 1g of sample (chicken minced meat) added into selenite cystein & TSB broth. Mix the content of the tubes thoroughly. Incubate the tubes at 37°C for 24 hrs. Observed turbidity & inoculate a loopful culture from Selenite Broth & TSB broth &Streak on the SS agar & EMB agar. Incubate the plates at 37°C for 24hrs.Next day observed the result.

Antimicrobial activity: Antimicrobial activity of vinegar and olive oil was checked using agar well diffusion method.

Results

Researchers have been done a number of experimental protocols to indicate the prevalence of enteric bacteria in poultry products. In our study, Specific staining and biochemical tests were performed for the characterization of isolated bacteria. The isolated bacteria are identified as *E.coli*, Klebsiella, Salmonella which are Gram –ve rods. Furthermore, antimicrobial activity of vinegar and olive oil also checked using agar well diffusion technique. The results of spread plate method for *E. coli* & vinegar are shown in Tables. It has been showed that Vinegar has shown effective antimicrobial activity against these bacteria including *E. coli*, Klebsiella, Salmonella & Shigella & also observed that virgin olive oil was also inhibit microbial growth. Standard antibiotic sensitivity test was used to screen the sensitivity bacterial isolates using different antibiotics which showed zone of inhibition i.e, Gentamicin (20mm), Nalidixic acid (24mm)& Chloramphenicol (18mm) as their sensitivity pattern.

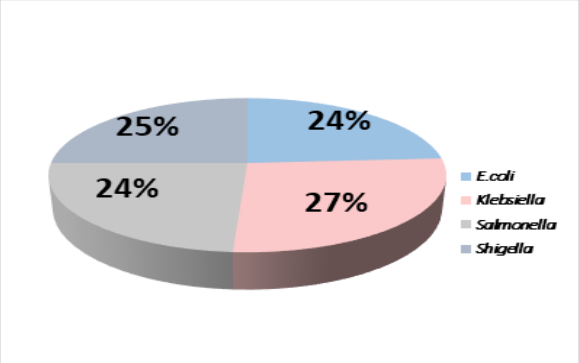

Figure 1: Antimicrobial Activities of Conc. Of Olive Oil & Vinegar against Microbial Isolates

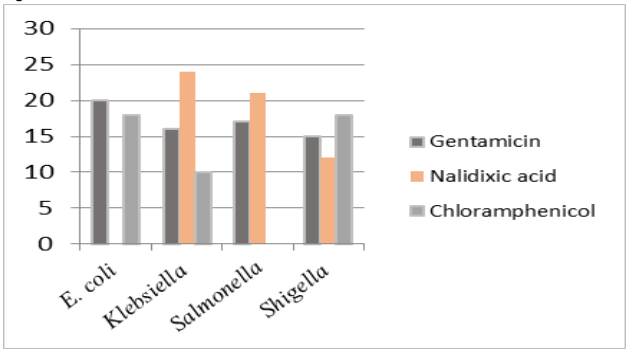

Figure 2: Antimicrobial Activities against Certain Microbial Isolates Compared with Gentamicin (CN), Nalidixic Acid (NA) & Chloramphenicol (C).

Table I: Morphological & Biochemical Characterization

S#	Media	Growth of micro-organisms
1.	EMB	Green metallic sheen with pin-pointed colonies of *E.coli*
2.	EMB	No green metallic sheen,produce large, mucoid,pink to purple colonies of *Klebsiella*
3.	SS agar	Black pin pointed colonies of *Salmonella*
4.	SS agar	Colorless coloniesof *Shigella*(do not ferment lactose)

Table II: Antibacterial Activities of Concentrations of Olive Oil & Vinegar against Microbial Isolate:

Concentrations	Inhibition zone (diameter in mm)			
	E. coli	*Klebsiella*	*Salmonella*	*Shigella*
Vinegar	22mm	25 mm	22 mm	23mm
Olive oil	0 mm	0 mm	0 mm	0 mm

Table III: Antibiotics Susceptibility Test against Microbial Isolates:

	Inhibition zone (diameter in mm)		
Organisms	**Gentamicin**	**Nalidixic acid**	**Chloramphenicol**
E. coli	20mm	0mm	18mm
Klebsiella	16mm	24mm	10mm
Salmonella	17mm	21mm	0mm
Shigella	15mm	12mm	18mm

0= no zone

Discussion

The vinegar showed significant antimicrobial activity against the food-borne pathogens. Vinegar was highly affected by the pathogens such as Salmonella, *E. coli*, Shigella & Klebsiella. Meat samples were easily affected by the pathogens such as negative bacteria. Food-borne pathogens were less inhibited by olive oil while mostly Salmonella, *E. coli*, Shigella & Klebsiella were inhibited by the vinegar (13). There was more inhibition zone of inhibition with vinegar as compared to the olive oil, as it has more bactericide effects of olive oil, inplace of phenolic compounds & with homemade disinfectants against food-borne pathogens including Salmonella, *E. coli*, Shigella & Klebsiella (14). It was found that olive oil compounds with a dialdehydic structure exhibit strong bactericidal activity& with organic compounds ,vinegar indicated that as highly solvent extract increase the sensitivity of the antibacterial activity. The growth of Salmonella, *E. coli*, Shigella & Klebsiella has been reduced in the presence of vinegar. However, Salmonella, *E. coli*, Shigella & Klebsiella have showed resistance to

olive oil. It indicates that the antimicrobial activity of olive oil component has not effective against these food borne pathogens when compare to vinegar (15). The high food-borne pathogens resistant towards a number of chemotherapeutics force the researchers to develop new bactericidal agent using natural products and identify effective natural antimicrobials to use as food preservatives (16).

Conclusion

From the above results it has been confirmed that Vinegar has shown strong antimicrobial activity of due to the acetic acid and also used commercially as a strong preservative as compared to olive oil that contain polyphenolic compounds. Food-borne pathogens are gradually fast more resistant to antibiotics. Polyphenols and acid both are effective against microbial reduction & used as an additive in food products.

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