

## Antibiotic susceptibility pattern of bacteria isolated from freshly cut watermelon fruit sold within Abakaliki metropolis (Presco junction) Ebonyi State Nigeria.

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### ABSTRACT

The antibiotic susceptibility pattern of bacteria isolated from freshly cut watermelon fruit sold within Abakaliki metropolis (Presco junction) Ebonyi State Nigeria were analysed. About six bacteria species were isolated which include: *Bacillus species*, *Esherchia coli*, *Staphylococcus species*, *proteus species* and *Salmonella*. Out of the six, three are gram positive while three are gram negative. Escherichia coli showed the highest zone of inhibition zone diameter of LV (14mm), CIP (12mm) and no inhibition zone to CE, CT, E AP, PF, N, CM, AU, AM, CM. Pseudomonas species showed the highest zone of inhibition zone diameter of NB (12mm) and CN (10mm) and no inhibition zone to CE, CT, E AP, PF, N, CM, AU, AM, CM,. *Staphylococcus aureus* showed the highest zone of inhibition zone of CIP (18mm) and LV (18mm) CE, and no inhibition zone to CT, EAP, PF, N, CM, AU, AM, CM. Finally Salmonella species showed the highest zone of inhibition zone diameter of LV (18mm) CIP (14mm), PF (12mm).

Keywords: Antibiotic susceptibility, watermelon, fruit, inhibition zone and bacteria

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### INTRODUCTION

Consumption of fresh fruits vegetable continues to increase in many countries owing to consumer preference for fresher, more nutritious food that also happen to meet the needs of busier lifestyles [1,2,3,4]. The availability of fresh produce has increased such that these products are obtainable of at all times during the year, and this relies hearty on the import of good from regular all over the globe. Despite the benefits derived from eating raw fruits and vegetables quality and safety is still an issue of concern as these foods have long been known to be vehicles for transmitting infections disease [5,6,7,8]. The destruction of surface cell during processing which includes, peeling, shredding, slicing etc exposes the fruits to microbial contamination. High water content of the

fruit and low acidic tissues of the fruits is also good medium for microbial growth and multiplication [9,10]. Freshly cut water melon is marketed as halves, quarters and slices. They are usually eaten without further cutting, peeling or rinsing as it has been prepared and packaged by the vendors. Water melon is a warm season crop in the cucurbit family and this fruit is grown in various regions in Nigeria [11,12,13]. Watermelon is the second largest fresh market vegetable produced with 1, 116 acres and accounts for 16% of the total fresh market vegetable acreage [14,15]. The increased consumption competed with the associated risk of food borne illness to which consumers may be exposed to have become a matter of great concern [16].

## Morphological characterization of the isolates

The morphology of the bacterial isolates were identified recorded as seen below in Table 1

Table 1: Colony characteristics, Gram reaction and cell morphology of the isolate

S/N	Colony characteristic	Gram reaction	Cell morphology
1.	Yellow, smooth low convex	Positive	clusters, non-motile and non capsulate
2	Grey (light yellow mucoid)	Negative	Really capsulated rods single shape
3	Lactose fermentes, pink	Negative	Rod, short and straight Colony on McConkey aga smooth, lightly moist shiny, short edge entirely
4	White in nutrient medium, smooth edge and convex surface	Negative	Rod motile produces water soluble pigment which diffuse through the medium.

## Biochemical Test Result of the Isolates

The biochemical test result of bacteria isolated from freshly cut watermelon is as shown in table 2 below. About Six (6) bacteria species were isolated which include: *Bacillus species*, *Esherchia coli*, *Staphylococcus species*, *proteus species* and *Salmonella*. Out of the six, three are Gram positive while three are Gram

negative. Biochemically, two are indole positive except *Escherichiacoli* and *proteus* that are indole negative. Four isolate are catalase positive and one is oxidase positive. Furthermore, *Staphylococcus species* are the only isolate that is coagulase positive.

Table 2: Biochemical test results of the isolates from the test sample

S/N	Catalase test	Coagulase test	Oxidase test	Indole test	Suspected
1	Positive	Positive	Negative	Negative	<i>Staphylococcus species</i>
2	Negative	Negative	Negative	Positive	<i>Escherichia coli</i>
3	Negative	Negative	Negative	Negative	<i>Salmonella species</i>
4	Negative	Negative	Positive	Negative	<i>Pseudomonas species</i>

## Antibiotic Susceptibility pattern of Isolates from freshly cut Watermelon Sold at Preco Junction Abakaliki

The Table 3 below shows the antibiotic susceptibility pattern (zone of inhibition) (mm) for bacteria isolates. *Escherichia coli* showed the highest zone of inhibition zone diameter of LV (14mm), CIP (12mm) and no inhibition zone to CE, CT, E AP, PF, N, CM, AU, AM, CM, *Pseudomonas species* showed the highest zone of inhibition zone diameter of NB (12mm) and CN (10mm) and no

inhibition zone to CE, CT, E AP, PF, N, CM, AU, AM, CM,. *staphylococcus aureus* showed the highest zone of inhibition zone of CIP (18mm) and LV (18mm) CE, and no inhibition zone to CT, E AP, PF, N, CM, AU, AM, CM *Salmonella species* showed the highest zone of inhibition zone diameter of LV (18mm) CIP (14mm), PF (12mm).

Table 3: Antibiotic Susceptibility pattern of Isolates from freshly cut Watermelon Sold at Preco Junction Abakaliki.

Organism name	ci	CN	OF	NB	LV	CD	AP	Pf	N	CM	C	AM	Au	CT
	5u	10ug	5ug	10ug	50ug	10ug	30ug	30ug	100ug	30ug	10ug	30ug	30ug	30ug
	g/m	/m	/m	/m	/m	/m	/m	/m	/m	/m	/m	/m	/m	g/m
<i>Escherichia</i>	12	6	10	4	14	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
<i>Pseudomonas</i>	10	16	4	12	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
<i>Salmonella sp</i>	14	6	10	Nil	18	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil
<i>Staphylococcus Aureus</i>	18	8	12	8	18	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil

KEY:NB= Norfloxacin, CIP = Ciprofoxacin, CN= Gentamycin, OF= Ofloxacin, CD= Gindamycin, E= Erythromtcin = CT = Cetriasone, Ap = Ampicillin and coxacillin

CE= Cifixin, LV = Levofloxacin, = AU = Augumentin, PF = Pefloxacin = CM = Clarithromycin, C= Chlorophenicol, Nil: No inhibition zone.

Table 4: MULTIPLE ANTI-BIOTIC RESISTANCE INDEX AND PERCENTAGE RESISTANCE AND SUSCEPTIBILITY

Organism name	b=18 numbers resisted	multiple anti biotic resistance index	% resistance	% susceptibility
<i>Escherichia coli</i>	12	0.67	67	33
<i>Pseudomonas sp</i>	15	0.83	83	17
<i>Salmpnella sp</i>	11	06	61	39
<i>Staphylococcus</i>	13	0.72	72	28

KEY: b= total number of antibiotic used

DISCUSSION

The presence of enteric bacteria in the processed/ready-to eat foods is evidence of the poor microbiological quality of the foods in the different countries [17]. Isolated enterobacteria as well as *Pseudomonas and Staphylococcus aureus* from ready to eat fruits [18] showed that the presence of these bacteria especially Salmonella is due to improper disinfection and cross contamination from hands packaging among other possible causes. The exposure of this

freshly cut watermelon and poor hygiene during the processing (the knife, nylon, probably not washing the fruit) need to be emphasized due to the presence of pathogenic bacteria like *Staphylococcus aureus, Escherichia coli, and Salmonella species* with colony forming unit of  $6.6 \times 10^4$ - $9.0 \times 10^4$  Cfu/ml as detected reflected to the improper and unhygienic standard of sellers at Presco junction constituting a public health hazard to population at presco junction Abakaliki this result is in

agreement with (Gulf standards [19]. The relatively higher bacteria counts were due to poor hygienic conditions. The presence of *Salmonella species Escherichia coli, Pseudomonas species and Staphylococcus aureus* as isolated from freshly cut watermelon could be as a result of poor hygiene and not adhering food sanitation principle, thus can lead to food borne diseases like dysentery diarrhea and stomach ache this result is in agreement with [20,21,22].

The isolated *Escherichia coli* was subjected to the various biochemical test was observed to Gram negative, bacilli, catalase, coagulase, and oxidase negative. The isolates were also subjected antibiotic susceptibility testing to ascertain their possible susceptibility to the various antibiotics with varying concentrations. Observation indicated that the bacteria isolate varied in their susceptibility pattern to a number of antibiotics used in this study. *Staphylococcus aureus* has the highest zone of inhibition zone diameter of CIP (18 mm) and LV (14mm), *Escherichia coli* has the highest zone of inhibition zone diameter of LV (14mm), CIP (12 mm), *Salmonella species* has the highest zone of inhibition zone diameter of CIP (14mm), PF (12mm). The multiple antibiotic resistance index in table 5 revealed that the isolated bacteria showed a high resistance to the antibiotic used. *Pseudomonas* (83%) has the highest the (72%). While *Salmonella species* and *Escherichia coli* showed the highest susceptibility of 39% and 33% respectively. The high resistance of

*Pseudomonas* is attributable to a concerted action of multidrug effluxpumps with chromosomally encoded antibiotic resistance genes (e.g *mex AB, mex XY*, etc) and the low permeability of the bacterial cellular envelopes. *Pseudomonas species* as it develops acquired resistance either by change in chromosomally encoded genes or by the horizontal gene-transfer of antibiotic resistance determinants. It has been proven that mutations in DNA-gyrase are commonly associated with antibiotic resistance in *Pseudomonas aeruginosa*. These mutations, when combined with others confer high resistance without hindering survival. Additionally, genes involved in cyclic-di-GMP signaling may contribute to resistance as was observed in *Pseudomonas aeruginosa* isolated from the sample (Mah *et al* 2003). *Staphylococcus aureus* also on the other hand has been recorded to produce deoxyribonuclease, which breaks down the DNA, lipase to digest lipids, staphylokinase to dissolve fibrin and aid in spread, and betelactamase for drug resistance. This resistance relies on LPS modifications and extracellular proteases, such as ZapA, this is not surprising why *Staphylococcus aureus* isolated from the test sample was resistant to the antibiotic disc used in this research [9]. *Staphylococcus aureus* also produces deoxyribonuclease, which breaks down the DNA, lipase to digest lipids. This has indeed shown the severity of being infected by such microorganism that showed resistance to the antibiotics disc used in this work.

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