Original Research Article

~~COMPARATIVE ANALYSIS OF~~ BACTERIAL FLORA OF VEGETABLES COLLECTED ~~DIRECTLY~~ FROM THE SUPERMARKET AND VEGETABLE MARKET

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Abstract

To prevent food borne diseases,microbiological control is very important in the food industry. Therefore, the present investigation was undertaken to conduct~~for~~ a microbiological quality assessment of fresh vegetables that were collected from several regions of Chandigarh.The~~Our~~purpose of this study was to determine the bacterial load and safety of vegetables presented for salein the ~~in~~marketplace. Vegetable samples (tomato and capsicum)collected from two different sites~~i.e.~~(vegetable~~s~~ market and supermarket), were analyzed for their bacteriological contaminants following different procedures. The maximum bacterial count present ~~on~~ in thevegetable market was compared to that of the super market. The micro flora of these vegetable samples was found to be dominated by *Staphylococcus*and *Bacillus*. *Bacillus*and *Staphylococcus*were detected in tomato and Capsicum respectively. *Bacillus* and ~~s~~*Staphylococcus*~~were~~were included ~~in~~as the most abundant species and as~~opportunistic~~ pathogens of ~~which may raise~~ concern when working to improve the microbial quality of fresh vegetables. Our study demonstrated that the vegetables, sold in thevegetable market,were found to contain a~~with~~ higher microbial load that may represent a greater risk for human health. Hence, for many microorganisms, vegetables may act as a reservoir ~~from where they will to~~be colonize~~d~~ and infect the host.

Keywords

Microorganism, Identification, Biochemical test, Microbial load, Vegetables.

Introduction

~~Microbiology is the study of microorganism those which are so small that they cannot be seen with the naked eyes and observed only by microscope.Microbiology and allorganisms include microbes that are divided into prokaryotes and eukaryotes. Prokaryotes are always single cell and DNA is not enclosed by a membrane, whereas eukaryotes are multi cellular organisms where DNA is closed by a membrane. Robot Hooke observes first microbes in fruiting bodies of moulds. Leuwenhoek is father of microbiology as he experimented with the microbiology in 1670.Scientific microbiology was developed in 19th century through the Louis Pasteur and Robert Koch work. Microbiology includes bacteria, archaea, virus, fungi, protozoa and algae.~~There are ~~present~~

several pathogenic microbes that have found their way into fresh vegetables and fruits over the years leading to spoilage~~which are a great source of human healthy diet~~(Balali et al,2020).Spoilage is the process in which fruits and vegetables (a great source of human healthy diet)~~is~~ are contaminated to the point that the ~~and any change which reduce a~~ product ~~and~~ becomes unacceptable for human consumption. Some spoilage organisms such as yeast target ~~the~~ fruits and vegetables due to their low pH which allows the~~and~~ bacteria to~~can~~ grow on the~~fruits and vegetables~~ surface of the produce.Human infection and outbreak~~s~~~~is~~are associated with the consumption of raw vegetables (Beuchat et al, 2022). Bacterial spoilage is the primarycause of tissue softening as the pectin ~~are~~ is degraded. Micro flora is dominated by spoilage bacteria such as *Bacillus cereus*, *Salmonella*, *E.coli*, and *Clostridium*, and *Staphylococcus*~~etc~~ (Tambekar et al, 2006). Food poisoning ~~is the~~ can become a major problem ~~in case~~ when items~~it~~ are ~~was~~ not stored properly. ~~The c~~Common~~lyfound~~bacteria that cause~~s~~ food poisoning are*Salmonella, Staphylococcusaureus*, and *E.co~~i~~li. Ba*~~etc. Common ba~~cteria are often present on the surface of vegetables and fruits like *Staphylococcus*, *Bacillus, E.coli, Clostridium, and Agrobacterium.*

Nutrients are necessary for the growth of these~~the~~ microbes.The substrate on which bacterial cultures are grown~~is done~~ is known as the medium which provides both nutrition and pH to the organism. There are generally two different types of~~culturenutrient media such as a NAM, PDA, and YMA etc. On the basis of consistency,there were used two types of media~~media utilized~~i.e.~~ solid media andliquid media.SSolid media were~~ are used for studying the cloning character of the bacteria andliquid media are used for~~the~~ profuse growth ~~e.g.~~such as with a blood culture**.** ~~On the basis of C~~chemical composition studies require two types of media a ~~were used i.e.~~routine laboratory media and a synthetic media. Autoclave, dry heat, and radiation methods ~~were used as~~are common laboratory sterilization methods.Human pathogens commonly associated with fruits and vegetables inlude*Bacillus, Staphylococcus, E.coli, and Salmonella.* Microbes found on kitchen surfaces may have originated from a produce source. Fruits and vegetable contamination may occur at any stage from production to consumption. Fresh apples, peppers, tomatoes and capsicum are known to harbor large bacterial populations. The presence of *Staphylococcus* in retail food has already been reported in China (Shubo et al, 2015).

This study evaluates the diversity of the~~Here are mentioned some~~bacterialcommunity found~~associated with~~on the surface of vegetables found in the marketplace utilizing microbial plate counts and biochemical testing.~~.Fresh apples, peppers, tomatoes and capsicum are known to harbor large bacterial populations. We were started to explore the diversity of these communities.Human pathogens can be associated with fruits and vegetables examples*Bacillus, Staphylococcus, E.coli, and Salmonella.* Many of the microbes found on the kitchen surface appear to come from produce source.Fruits and vegetable contamination occur at any stage from the production to consumption.Thepresence of*Staphylococcus* in retail food has been reported in China (Shubo et al, 2015).~~

Materials and Methods

Location of samples

Bacteria samples wasere cultured from fruits and vegetables purchased in carried out from the vegetable market sector 40 Chandigarh and a supermarket SCF4 sector 9D Chandigarh. *Bacillus c*ollected from the surface of tomato was culturedollected from the vegetable market fruit and *Staphylococcus* falling microorganisms were collected from the surface of a capsicum was collected from the supermarket.

Composition of Nutrientagar medium

Bacteria falling on the surface of vegetables were measured by via two types of agar media(nutrient agar media and peptone dextrose agar media) and two types of growth media (Mannitol salt agar and LuriaBertani)**.** Nutrient agar media (Table 1) wasutilizedsed for the bacterial growth counts as. It can effectively grow a variety of bacteria types and as well as fungi.Peptone dextrose agarwas a general media utilized for the fungal isolation from plant samples (Table 2).Here oOrganic compounds wereas used as a source of energy.Yeast extract peptone dextrose was used as a growth medium to grow Yeast.Mannitol salt agar media contains a high salt concentration and wasere used for as a selective and differential growth medium in the laboratory (Table 3).It contains high salt concentration.The identification of *sStaphylococcus aureus* in clinical isolates requires a battery of testswhich areand costly in resources in a limited setting.LuriaBertani (LB) is anutritionally rich medium for culturing the bacteria (Table 4). LB media allows for the plating of bacterial cultures and the growth of colonies.

Table1Nutrientmedium

Chemicalname	g/l
Peptone	5
Beefextract	3
Sodiumchloride	5
pH	5.5
Agar	15

Table2Peptonedextroseagar

Chemicalname	g/l
Potatostarch	4

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Comment [O4]: Unless you are using different media than others, you do not need to list the recipe. Just erase anything that is not your own recipe and just state that you used nutrient agar, peptone dextrose, Mannitol salt agar, and LB Shorter is better for journals..

Dextrose	20
Agar	15
pH	7.5

Table3Mannitolsaltagarmedia

Chemicalname	g/l
Peptone	10
Beefextract	1.00
Sodiumchloride	75.0
D-Mannitol	10.00
PhenolRed	0.025
pH	7.3
Agar	15

Table4LuriaBertani(LB)

Chemicalname	g/l
Tryptone	0.25
Yeastextract	0.126
Sodiumchloride	0.125
pH	7.5

Identification of bacteria

Identification of bacteria was ~~done~~ conducted via ~~by~~ various~~different~~physical and chemical methods.

A. **Physical methods utilized**

1. **Shape of bacterial cell- rods or cocci**

~~AntonivanLeeuwenhoek first show microbes through a microscopes in 1670 and differentiate it on basis of their shape and size.Basic shapes of bacteria are Coccus (spherical), Bacillus (rod shape), and Spiral (twisted).~~

2. **Gram staining**

Was used to ~~Hans Christian's gram developed the gram stained technique in 1884.It is a common technique that were used to differentiate two large bacterial group based on their cell wall (Coico et al, 2005). The gram staining procedure~~ distinguish~~ed~~ between gram negative and gram positive groups by coloring thecell violet or red. ~~Violet color appears due to presence of thick layer of peptidoglycan in bacterial cell wall which retains the crystal violet.~~ This technique is useful for bacterial sample contamination assessment andobservation of morphological features of bacteria that were isolated from mixed cultures (Moyes et al, 2009).

B. **Biochemical testing included the**

~~1.~~ **Catalase test**

1. -Catalase is enzymes that detoxify hydrogen peroxide into molecular oxygen and water(Gagnon et al, 1959). A Catalase test is positive if bubbles are observed after adding hydrogen peroxide. It should appear as if simple water was dropped on the smear.Catalase test is used for gram positive bacteria and can utilize to distinguish Staphylococcus and Micrococcus.

~~2.~~ **Citrate test -**

2. Citrate test is used to determine the bacterial ability to use sodium citrate as the source of carbon (Table 5). The citratetest is possible for those organisms which are capable of fermenting citrate.~~Inoculate a tube having citrate medium with bacteria or it is also possible to streak a deep inoculation into "Simmons citrate tube" andincubateit.~~Positive test occurs~~was seen~~ when a particular color change is~~was~~

Comment [O5]: Please make a table of any bacterial load counts. Just one table or graph that shows all of the different types of bacteria found and their levels and place it in the results section. Thanks

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observed in the Simmons citrate tube and negative test was observed in case of no color change. The citrate test was used to distinguish between *Bacillus*,*Citrobacter*, *E.coil*and *Staphylococcus*.

Table5Citratetest

Chemicalname	g/l
Sodiumchloride	5
Sodiumcitrate	2
Ammonium dihydrogen phosphate	1
Dipotassiumphosphate	0.2
Magnesiumsulphate	0.2
Bromothymolblue	0.08

3. **Vogues -Proskauer (VP) test**

The ~~A~~ability of bacteria to convert glucose to acetoin creates a red/purple color near top of tube.Bacteria producing a negative Voges-Proskauer result exhibit no color change (Hasan et al,2015). When potassiumhydroxide is added into acetoin then acetoin is converted to diacetylthat later reacts with alpha-naphtol and make pink color compound (Table 6).This test depends on the digestion of glucose to acetyl methyl- carbinol. Color changes to pink was observedin positive test and no color change was seen in negative test.

Table6Vogues-Proskauer(VP)test

Chemicalname	g/l
Peptone	2
Dextrose	2
Potassiumphosphate	2
Ph	6.1

4. **Oxidase test**

This test is used to determine the presence of bacterial enzyme cytochrome oxidase(Tarrandet al, 1982). Cytochrome are iron containing hemoproteins that transfer electrons to oxygen to form waterin aerobic respiration.Cytochrome oxidase is a transmembrane protein complex, also present in the mitochondrial cytoplasmic membrane.Use a loop and pick the isolated colony from the fresh bacterial plate and rub it into filter paper after it add 2 drop of oxidase reagent on the organism smear and observe for color change. In Positive test, there was dark purple color and no color in case of negative test.

5. **Urease test**

Urease test identifies that organism that is capable of hydrolyzing urea to produce ammonia and carbon dioxide (Brink et al, 2019). Some bacteria have the enzyme that convert urea to ammonia and carbon dioxide which form ammonium carbonate in the presence of water. Urease test is a biochemical test that

detect the alkaline fermentation of urine with the resultant production (Table7). Rapids positive organism turns the entire medium pink within 24 hours.Negative organism produces no color change or yellow as a react of acidic production.

Comment [O6]: Again these are not really necessary just state the name of the test and a positive result is pink because and a negative result equals no color change for brevity. Please reduce this

Table7Ureasetest

Chemicalname	g/l
Peptone	1
Dextrose	1
Sodiumchloride	5
Potassiumphosphate	2
Phenolred	0.01
Urea	20
Agar	15
pH	6.7

6. **Methyl red test**

Many bacteria have ability to utilize glucose and converted into a stable acidic acid like acetic acids, formic acid or lactic acid, as the end product.Methyl red changes the color immediately and help to predict rather it's basic or acidic. Bacteria metabolize the glucose in pyruvic acid and later pyruvic acid metabolize through the mixed acid pathway to produce stable acids.Theacid production is different from species to species and depends on the enzymatic pathway present in the bacteria.Red color and yellow color or colorless appear in case of positive and negative test respectively(Table 8) (In Atlasal oral microbiology).

Table8Methyl redtest

Chemicalname	g/l
Peptone	2
Dextrose	2
Potassiumphosphate	2
pH	6.1

7. **Nitrate reduction test**

Nitrate test is used to determine the presence and absence of nitrate in the solution (Table 9). Nitrate test differentiate those bacteria that have ability to produce nitrate reductase enzymes. This enzyme hydrolyze nitrate to nitrite and nitrite further degrade into various nitrogen product like nitrogen oxides, nitrous oxides and ammonia.It can be performed by adding sulfanilic acid that will react with the nitrous acid and produce diazotized sulfanilicacid. This diazotized sulfanilic acid react with alpha-naphthylamine and form a red color compound in positive test. While no color was detected in case of negative test (Tlaieakhon et al, 2018).

Table9Nitratereductiontest

Chemicalname	g/l
Peptone	5
Beefextract	3
Potassiumnitrate	1
Sodiumchloride	30
pH	7

8. Carbohydrate test

The microbes utilize carbohydrate to produce energy in form of ATP(Table 10).Degradation of the monosaccharide, disaccharides and polysaccharides by microorganism under anaerobic condition is carried out in the fermentation. Its end product can either be organic acids like formic, lactic, or organic acids.The fermentation medium contain carbohydrate with PH indicator.After fermentation, organic acid productturns into yellow color with the reduction of PH.

A) Preparation of carbohydrates fermentation broth

Dissolvesodium chloride,trypticase and phenol red in 100 ml of distilled water and transfer into flasks.Add 0.5-1% of carbohydrate into the flask. Sterilize in autoclave at 115degree Celsius for 10min.The overheating may result in breakdown of molecule and browning of sugar.Transfer it into the fermentation tubes or screw- capped tubesand labeled it.

B) Bacterial culture inoculation into fermentation medium tube

Incubatefermentationtube for 18 hours at 37 degree Celsius and observe it for acids and gas production.When the medium changes to yellow color, it means organisms are able to ferment carbohydrate. If it retains red color, means organism do not utilize the carbohydrate (Weldezgina etal,2016).

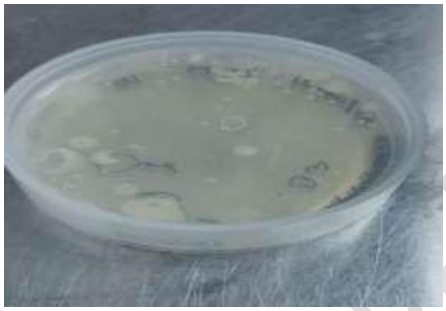
Table10Carbohydratestest

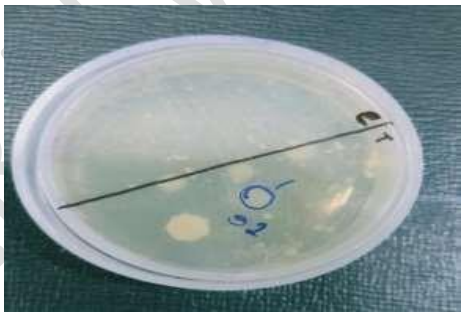
Chemicalname	g/l
Peptone	5
Beefextract	3
Sodiumchloride	5
pH	6.8

Result

The ~~Our experimented p~~Petri plates exhibited~~showed the~~assorted~~e~~ colonies of bacteria that were present on the surface of vegetables.The bacterial growth on the Vegetable Market plates was ~~had~~ higher~~number of bacterial presence as~~ compared to that of the supermarket ~~area~~plates. The sector 40D vegetable marketsproduced~~had~~ 20 bacterial colonies on NAM media ~~&~~while the Supermarket~~area~~ plates ~~had~~ produced 15 bacterial colonies (Fig. 1). We found *Bacillus* bacteria on tomato ~~that were taken~~ from the vegetable market and *Staphylococcus* bacteria was observed on the surface of capsicum annum from the~~of~~supermarket. ~~Confirmationof *Bacillus* and *Staphylococcus*bacteria was done by different type of tests as described below.~~

FIG.1Bacterialcolonies~~appear~~present on thePetri plates





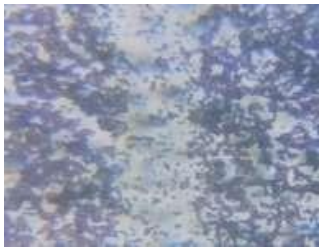
***Bacillus*bacteriacollectedfrom the vegetable market(tomato)** **Staphylococcus bacteriacollected fromsupermarket (Capsicum)**

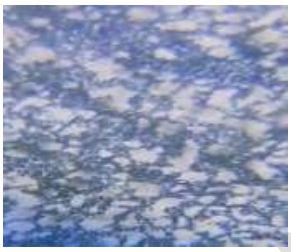
1. **Gram staining**

~~The bacteria react to the Gram stain and gram stain is purplecolored. After the stain combine with bacteria, the bacteria will stay purple or turn pink.~~ In our experiment, ~~both vegetables~~plates(marketand supermarket) ~~samples~~ containing *bacillus*and *staphylococcus* respectively were found to be Grampositive as they exhibited a~~with~~ purple color(Fig. 2).

Fig.2Gramstaining experiments

Comment [O7]: Nice plates please state in the materials and methods how many of each plate you made and the number of reproductions eg 6 plates in total were created for the supermarket and 6 plates for the vegetable. However many that you did. Did you do any controls- please list them. In materials and methods as well.





SampleA(Bacillus) **SampleB(Staphylococcus)**

2. **Catalase Test**

The Catalase test is used to differentiate bacteria. ~~The~~ B~~b~~acteria produce the enzyme Catalase by ~~that by~~ using ~~the~~ oxygen, to protect~~s~~ themselves from the toxic by-products of oxygen metabolism. In~~Both~~ the*Bacillus* and ~~,~~*Staphylococcus* samples bubbles present confirmed that the bacteria was Catalasepositive (Fig. 3).

Fig.3Catalasetest

SampleA(*Bacillus*) **SampleB(*Staphylococcus*)**

3. **Citrate test**

When an organism utilizes~~se~~ citrate then it exhibits a~~shows~~ positive reaction but not necessarily as the sole carbon source. The pH turns the pH indicator from green to blue. The blue color appears which indicate the test is positive.Both the*Bacillus* and *Staphylococcus*samples were found to bepositive as shown in fig 4a. Theobservedcolor change ~~is~~was ~~from~~ green to~~to~~ blue.

FIG.4(a)Citratetest

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SampleA(*Bacillus)*

SampleB(Staphylococcus)

4. **Nitrate test**

When nitrate is present in themedium, then a red color will be produced.In our experiment the*Bacillus*and*Staphylococcus* cultures did notexhibit ~~don'tshow any~~ a color change so both sampleswere found to benegative (Fig 4b).

FIG.4(b)Nitratetest

Sample A(*Bacillus*)

SampleB(*Staphylococcus*)

5. **Ureasemethod**

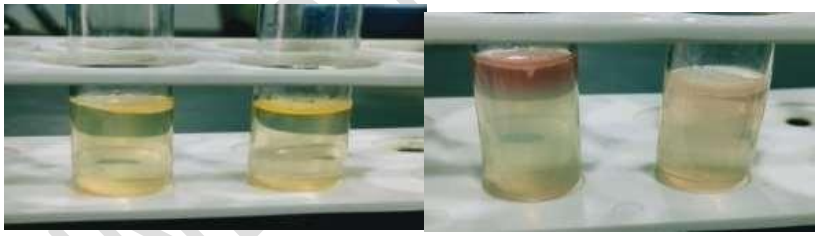
The product of decarboxylation of amino acids is urea. After thehydrolysis process, urea produces Carbon dioxide andAmmonia. In our experiment, both *Bacillus* and *Staphylococcus*sample showeda positive reaction by developing ~~the~~ an intense magenta to bright pink color in 15 min to 24 h (Fig5).

FIG.5 Ureasetest

6. **Methyl red test (MR)**

In this test, the test bacteria were grown in a broth medium that containedglucose. As we know, bacteria ha~~d~~s the ability to utilize glucose via~~with~~the production of ~~an~~ acid, ~~the~~ a color change~~d~~ was observed from yellow to red inthe broth cultures. *Staphylococcus* has the ability to utilize glucose and *Bacillus* does not have ability to utilize glucose,thus,~~so~~ the bacillus testwas~~showed~~ positive and the staphylococcus was ~~with~~negative~~result~~ (Fig 6).

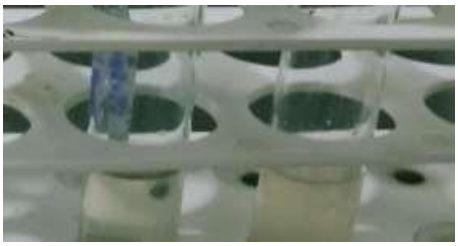
Fig.6 Methylredtest(MR)



SampleA(*Bacillus*) **SampleB(*Staphylococcus*)**

7. **Voges–Proskauer**

Voges–Proskauer or VP is a test used forthe detection of acetoin in a bacterial broth culture. This test is performed by adding potassium hydroxide and alpha-naphtholto th~~is~~e bacterial inoculated broth. Both samples *bacillus* and *staphylococcus*showed a negative reaction~~ i.e~~ via~~.~~ lack of a pink-red color (Fig 7).



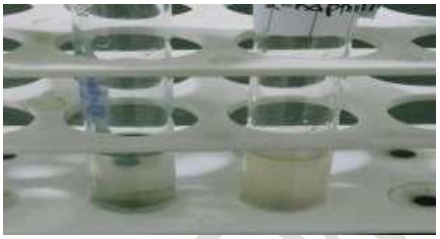


Fig.7Voges–Proskauer

SampleA(*Bacillus*)

SampleB(*Staphylococcus*)

8. **Oxidase test**

The presence of the cytochrome oxidase pathway~~is~~ was detected ~~by~~ via the oxidase test.Itcatalyzes the transport of electrons between electron donors and a redox dye ~~i.e.~~tetramethyl-p-phenylene-diamine in the bacteria. This dye is reduced to a purple color. B~~Here b~~oth *Bacillus* and *Staphylococcus*~~are~~ were negative because of no color changes (Fig 8).

Fig.8Oxidasetest

9. **Carbohydrate test**

During the Carbohydrate test, the medium changed to a yellow color due to theproduction of acid.Microbes produce~~s~~ organic acidsfollowing~~after~~ fermentation ofthe carbohydrates.Both *Bacillus* and *Staphylococcus*~~showed the carbohydrates test~~ were positive (Fig 9).

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Fig9Carbohydratestest

Fig9.1NutrientMediawithcarbohydratesforLB

Fig9.2NutrientMediawithCarbohydratesforMSA

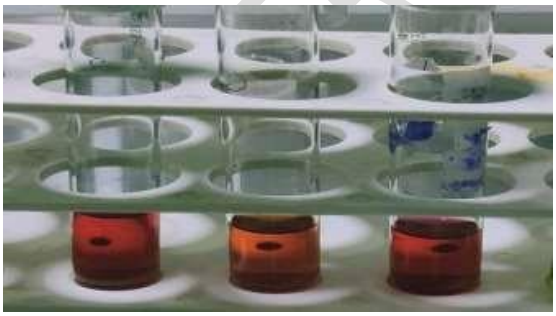

Fig9.3Following~~After~~inoculation, color changes occurred in sampleAandsampleB ~~Media~~

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Discussion

The Vegetable market ~~area~~ samples contained a ~~more~~ greater abundance ofbacterial flora compared to that of the~~the~~ supermarket. Thus,~~area aswe can see that~~ more contamination was evident in the~~present on the~~ Vegetable market samples.~~After o~~Observi~~i~~ations from ~~ng the results of~~ the surface growth ~~of microbial growth~~ showed~~count, we can state~~thatthe~~in~~ supermarket ~~area~~samples of ~~,s~~*Staphylococcus*growth ~~count was less i.e.~~ was~~50~~ 50 percent, which was less numerous~~ ascompared~~ than ~~to~~ the vegetable market samples, where the*Bacillus*count was 90 percent.Further, ~~more e~~additional experimentationwas ~~done~~ conducted to identify themicrobes from the environment of different places. Mostly bacteria ~~were found of~~ of human and soil origin were found. The microbes ~~come~~ from ~~the~~ humans ~~were~~are ~~~~mostly from the skin and respiratory tract, ~~were~~disbursed~~released~~ by sneezing or talking whereas the soil microbes were released ~~by~~ via dust. These infectiousbacteria makeus unhealthy by releasing toxinsthat damage our tissues, such as *Streptococcus*,

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Staphylococcus, *Bacillus, and E.coil*. Both *Bacillus* and *Staphylococcus* microbes are gastrointestinal pathogens, *Vibrio cholera* causes cholera, *E.coli* causes cystitis and*Bacillus* pathogen is capable ~~to~~ of causing disease due to the production of an enterotoxin or non-ribosomal peptide synthetase toxin. Tambekarand Mundhada in 2006 also reportedpathogens detected from fresh vegetables included~~is~~ *B~~b~~acillus*,*Staphylococcus*and*E.coil*. Several studies have reported the presence of pathogenic bacteria in vegetables and fruits, however the bacterial~~but the~~ counts were rarely documented(Olaimat et al,2012).Kuramoto et al, 2006~~Some other researchers reported that in 2005,~~reported that *Staphylococcus aureus* was thecausal agent of a food poisoning outbreak in Japan in 2005 where pickled radish was one of its sources (Kuramoto et al, 2006). It was alsoobserved that 50% of all vegetable samples that were collected from 39 major cities in China contained *B. cereus*. The level of contamination was more or less similar as to those of previous surveys in other~~different~~countries, ~~i.e.,~~ 57% in Mexico City, 20–48% in Korea (Chon et al, 2015), and 52% in the southeast of Spain(Flores-Urban et al, 2014). These reports, together with our study, indicate that*Bacillus* and *Staphylococcus* contamination in vegetables is very common. This resultsuggests that the consumption of vegetables contaminated with ~~these~~ pathogenic bacteriais a potential health hazard. Treatment of ~~these~~ bacterial infections~~ also~~ includes good nutrition and intensive care. People who have had closed~~ ~~contact with a person with bacterial disease may also need to be treated for the disease.Thus during the preparation of vegetables ~~S~~some precautionsmay be required like washing your hands, kitchenutensils, choppingboards, and countertops before and after preparing fruits and vegetables. Moreover, it is very important to ~~C~~clean the vegetables and fruits prior to consumption~~before eating~~.

Conclusion

Thise~~ ~~study~~experiment~~reported pathogenic bacteria found on ~~showed~~the~~vegetables collected from the vegetable~~s~~ market and super market in~~from~~ Chandigarh. The hygienic quality of the vegetables and water in the areawas ~~seen~~ very poor due to the higher mean bacterial counts found(many~~and it was~~ recordedwere beyond the standard safe limits). The~~V~~ Vegetable micro flora was dominated by*Staphylococcus*and*Bacillus*. The presence of~~b~~*B*acillus bacteria i~~o~~n the vegetablemarket was ~~in~~higher~~number~~ than the~~s~~*S*taphylococcus bacteria present ~~o~~in the supermarket. Washing vegetables and then storing them in food grade antibacterial chemicals may assist with reducing pathogens and other microbial flora.Thus, new and improved~~Good~~ agricultural practicesare required~~should be used~~along with various safety measures during the production of fresh fruits and vegetables in the region.~~ It is better to wash vegetables and stored to them in food grade antibacterial chemicals for a good time to free pathogens and reduces the microbial flora.~~

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