

PLESIOMONAS SHIGELLOIDES IN SOME VEGETABLES: A RARELY OCCURRENCE PATHOGENIC VIBRIONACEAE IN GOMBE

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ABSTRACT

In the North eastern part of Nigeria, very little is known about *Plesiomonas shigelloides* in clinical laboratories and environment. Most research only sought of other members of Vibrionaceae in our medical laboratories, due to uncommon occurrence, lack of facilities or due to ignorance, would there be report of any gastrointestinal illness. *P. shigelloides* is an aquatic microorganism recognized as potential human and animal pathogen. It is against this background this study aimed at determining and occurrence of *P. shigelloides* in vegetable which formed part of our daily diet. A total of

Introduction:

Significant human demographics, behaviour and land use changes have been witnessed in Nigeria within the last decade. These changes have influenced the lifestyle of the citizenry contributing to new disease emergence by changing transmission dynamics to bring livestock and people into closer and more frequent contact with pathogens. Such changes have led to increases in human

forty-two samples; fourteen (14) lettuces, fourteen (14) cabbages and fourteen (14) tomatoes were collected and cultured by enrichment in alkaline peptone water (APW). Sorbitol McConkeyagar and sheep blood agar were used for the isolation. Colonies appeared on SMA and SBA was screen with oxidase test and sub-cultured on nutrient agar for other biochemical tests. No single isolates was identified to be *P. shigelloides* in the results of all samples of all vegetables sampled. This suggests that vegetable samples sold in Gombe markets are safe and free from *P. shigelloides*.

Keywords: “freshwater”, “estuarine”, “halophilic”, “lettuce”, “cabbage” “tomato”.

agricultural activities in both residential areas and their environments. Run-off water from such pathogenic infected agricultural wastes or soils and contaminated human wastes used for agricultural land fertilization could aid in the contamination of surface or ground water sources for domestic drinking purposes and irrigation of food crops such as vegetables and fruits. *Plesiomonas shigelloides* is an indigenous inhabitant of freshwater, sediment, and the intestinal tract of cold-blooded aquatic animals (Dulger, 2004). It is not only found in the aquatic environment in the tropical and subtropical regions, but also in cold climates (Lukasiewicz *et al.*, 2006). Based on previous reports, Dulger (2004) concluded that the highest isolation rates of these bacteria in surface waters were during the summer months, and no, or very few isolations in winter.

Human infections with *P. shigelloides* are mostly related to drinking untreated water, eating uncooked shellfish, and visiting countries with low sanitary standards. In a case-control study from the United States in the 1980s, two factors that were strongly associated with infection with *P. shigelloides* were foreign travel and the consumption

of raw oysters (Wong *et al.*, 2000). Recent studies implicated *P. shigelloides* as an opportunistic pathogen in immunocompromised hosts, and especially neonates (Niedziela *et al.*, 2002). *Plesiomonas shigelloides* is an opportunistic pathogen (Jeppesen, 1995). Diarrhoea is one of the leading causes of morbidity and mortality in populations in developing countries, and is a substantial health issue throughout the world. Recent epidemiological evidence has strongly implicated *P. shigelloides* as a significant cause of diarrhoeal disease (Theodoropoulos *et al.*, 2001), where it has been implicated as an aetiological agent in sporadic cases and outbreaks of diarrhoea in various parts of the world, and the causative agent of gastroenteritis as well as of extraintestinal infections (Rager *et al.*, 2000; Wong *et al.*, 2000). Recent attention has been drawn to this organism since it also has been implicated as an emerging pathogen (Krovacek *et al.*, 2000; Theodoropoulos *et al.*, 2001; Gonzalez-Rey *et al.*, 2004), and a causative agent of extraintestinal infections, which include meningitis, sepsis, arthritis, cholecystitis, and endophthalmitis (Wiegand and Burak, 2004).

Treatment with antibiotics is seldom required. However, appropriate antibiotic therapy is necessary for severe infections. Most frequently described severe infections are cases of septicaemia and meningitis, occurring mainly in patients with underlying health disorders and in immunocompromised patients (Wiegand and Burak, 2004). Many of the patients with extraintestinal disease died as a direct result of their plesiomonad infections (Clark *et al.*, 1990). Abbott *et al.* (1991). Reports of *Pleisomonas* infections in Africa are scanty and particularly in Nigeria. In Nigeria, it is common to find clinicians diagnosing of gastroenteritis in the field and instituting treatment without confirmatory diagnoses irrespective of possible core infection, a common phenomenon of Nigerian rural population. It is in view of these research wishes to look in to the possible occurrence of

Pleisomonas shigelloides in some vegetable samples that may cause food borne diseases in human and point out the risk attached to with the consumption of such vegetables. And for that purpose isolate and characterized the isolates as to determine the incidence.

MATERIALS AND METHOD

Sampling Area

The samples were collected from Shongo market and Gombe main market all of Gombe Local Government Area of Gombe state. Gombe State is one of the states in Northern-East region of Nigeria with marked long dry season periods. People rely on irrigated crops for source of vegetable from farmers. The farmers use irrigation pumps, rivers, stream and wastewater to water their crops. The area studied comprises of Gombe metropolis, which is located on longitude 110 10'E and 100 15'N of green witch meridian above sea level with the Sudan savannah ecological zone of Nigeria. With a mean annual rainfall ranges of 600mm-1200mm and the maximum and minimum temperature of 22.7°C and 33.5°C respectively. The vegetation cover is open savannah wood land with trees up to six meters or more.

Sample collection

Forty-two (42) samples of vegetables were obtained. Fourteen (14) cabbages were bought, seven (7) from Shongo market and seven (7) from Gombe main market. Fourteen lettuces were bought, seven (7) from Shongo market and seven (7) from Gombe main market. Fourteen tomatoes were bought, seven (7) from Shongo market and seven (7) from Gombe main market. All samples were collected from different vendors. And after purchasing the samples, were all taken to the Biology laboratory of Federal University for processing and analyses.

Isolation and Identification

One gram (1 g) each of samples was added to nine milliliter (9 ml) of distilled water and mix well to form a sample homogenate. The homogenates were serially diluted 10^2 from which 1 ml each was inoculated in 9 ml alkaline peptone water (Lab M, UK) incubated at 37°C for 4 hrs as describe by Sata *et al.*, (2003) for resuscitation. The inoculated medium was later sub cultured on Sorbitol McConkey agar and Sheep blood agar, plates were then incubated for 24 hours at 37°C . After isolation, colonies were biochemically subjected to oxidase test, positive colonies were then subjected to Catalase test, Motility test, Esculin hydrolyses, Indole test, Methly Red, Voges Proskauer test, lysine and ornithine decarboxylase, fermentation of Lactose, mannitol, inocitol, sucrose and salt tolerance test at 0%, 3%, 6%, 8% and 10% for proper identification, as described by Konneman *et al.*, 1994 and Cheesbrough, 2005).

RESULTS

Of the forty-two (42) samples of vegetables that were cultured and identified, there was 57% of growth on both SMA and SBA for cabbage samples, however none was biochemically identified to be *Pleisomonas shigelloides*. Similarly, in the tomatoes and lettuce samples, there was 64% and 78.5 % growth; also none was biochemically characterized to be growth of a *P. shigelloides*. The results shows 0% occurrence of *Pleisomonas shigelloides* based on the biochemical tests conducted, shows that vegetables (cabbages, lettuces and tomatoes) sold in Gombe metropolis market are free from *Pleisomonas shigelloides*.

DISCUSSION

This results shows zero per cent occurrence of *Pleisomonas shigelloides* based on the biochemical tests conducted, demonstrate

that vegetables (cabbages, lettuces and tomatoes) sold in Gombe metropolis market are free of *Pleisomonas shigelloides* contamination. Although there were some few growth of other bacteria that were not targeted, possibly the bacterium could not survive the non halophilic condition of vegetables. The pH of vegetable was reported to ranges from 6.0-7.0, which probably did not support the growth and survival of the *P. shigelloides* thus may have been a hindrance to the occurrence of *Pleisomonas shigelloides*. The average water content of vegetables is about 88%, with an average content of 8.6% carbohydrates, 1.9% proteins, 0.3% fat, and 0.84% ash. The total percentage composition of vitamins, nucleic acids, and other plant constituents is generally less than 1%. The pH range of most vegetables is within the growth range of a large number of bacteria, and the relatively high oxidation-reduction (O/R) potential of vegetables and their lack of high poisoning capacity suggest that the aerobic and facultative anaerobic types would be suspected to form the vegetables microbial flora or contaminants (Jay, 2000). It is therefore obvious that these vegetables were not in any way contaminated by agencies of primary contamination (water and soil, fecal contamination, animals, air/dust and handling processes). It may be born out of the fact that *Plesiomonas shigelloides* is an indigenous inhabitant of freshwater, sediment, and the intestinal tract of cold-blooded aquatic animals and in cold climates, as observed by Dulger, (2004) and Lukasiewicz *et al.*, (2006). Accordingly, from epidemiological data, this bacterium has not been reported to occur very often in temperate countries like Nigeria, this was earlier on reported by González- Rey (2003) that, this bacterium is called the “Asian” bacteria because of the high incidence of isolations in countries such as Japan and Thailand. However, the research attention has been drawn to fact that, this organism has been implicated as an emerging pathogen (Krovacek *et al.*, 2000;

Theodoropoulos *et al.*, 2001; Gonzalez-Rey *et al.*, 2004), and a causative agent of extraintestinal infections, (Wiegand and Burak, 2004). This research wish to conclude that the vegetables sample collected for this work have not been cross contaminated with either the primary or secondary reservoirs of the bacterium.

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