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MYCOBIOTA, MYCOTOXINS, AND HEAVY METALS FROM INSTANT NOODLES IN SAUDI ARABIA

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Abstract :Forty-two samples of instant noodles (fast food meals) were collected from several markets at El-Riyadh, Saudi Arabia and examined for the occurrence of fungi, mycotoxins and pathogenic bacteria in addition to cadmium, lead and aluminum, to stand on their safety for human consumption. Twenty-five fungal species, in addition to one species variety belonging to 9 genera were isolated on both glucose-Czapek's agar and PDA (Potato Dextrose Agar) media at 28°C, before and after cooking process of instant noodle products used. Three fungal genera, isolated with different frequencies on both media of cooked and uncooked noodle samples used in this study, were *Aspergillus* (31 – 50%), *Penicillium* (9.5 – 33.3%), and *Cladosporium* (9.5 – 19%). Chromatographic analysis recorded the presence of citrinin which detected in only one out of 42 uncooked samples.

The bacteriological analysis of instant noodle samples according to NMKL, indicated that noodle samples used were free from pathogenic bacteria. The cadmium, lead & aluminum concentrations in each instant noodle samples were determined using atomic absorption spectrophotometer (AAS). The highest concentrations were recorded for cadmium (0.076 ppm), lead (1.143 ppm) and aluminum (11.250 ppm).

Key Words: Mycobiota, Mycotoxins, Heavy metals, Instant noodles.

Introduction

In a modern society, and requirement of fast model life people always use fast food meal in their daily life to solve the problems of spending more time, and difficulty of preparing the food. Such these fast meals may be has some agents of contamination such as fungi (or its products mycotoxins) or pathogenic bacteria, and heavy metals. Nong (2005) listed the ingredients of Instant Noodles (product) Neoguri Udon(Seafood & Spicy) consist of, noodle, wheat flour, palm oil, potato starch, salt. Dried solids packet, Mussel, green onion, carrot. Powder soup packet, salt, monosodium glutamate, glucose, sugar, Soy sauce powder (Soybean

powder, salt, malto dextrin), Spices (Red pepper, garlic, onion, black pepper), Bonito powder, cuttlefish powder, corn flour, caramel color. Young *et al*, (2006) assessment of fresh chinese white salted noodle quality on four Sichuan major varieties. Several workers studied the susceptibility of noodles and its ingrediants to fungal or bacterial growth for examples, Panasenco (1964) isolated fungi from starch, most numerous were *Aspergillus* about 30% of total count, *Penicilli* 25% and *Mucorales* 20%. Marshall (2002) recorded that *Aspergillus candidus* occurred in stored foods and feedstuffs such as wheat, corn, barly, dried macaroni, refrigrated drought product and flour. Xu *et al*., (2008) studied the effect of variables temperature (50-90°C), time (1-25min.), and pH (2 to 8) on the residual antifungal activity (RAA) against *Penicillium chrysogenum, Fusarium graminearum, Aspergillus flavus*, and *Penicillium* spp. isolated from moldy noodles. Berghofer *et al*., (2003) determined the distribution of the microbiological status of Australian wheat and microorganisms in the flour milling fractions and end products. They reported that yeasts and moulds were the most frequently detected microorganisms throughout this survey and the most common moulds isolated were *Aspergillus, Penicillium, Cladosporium* and *Eurotium* sp. Simon *et al*., (1997) determined the bacteriological status of pasta and noodles available in the ACT market and they reported that the most noodle samples were microbiologically acceptable.

Mycotoxin contamination of foods has gained much global attention in recent times owing to its potential health hazards. In addition to hazard assessment, data on the natural occurrence of mycotoxins in various commodities and food intake are needed to enable exposure assessment (Udagawa, 2005). Mycotoxins are a group of structurally diverse secondary metabolites produced by various fungal species. These toxic compounds can contaminate foodstuffs, crops and human foods (Coulombe,1991). Mycotoxins can be classified as hepatotoxins, nephrotoxins, neurotoxins, immmunotoxins and so forth. Cell biologists put them into generic groups such as teratogens, mutagens, carcinogens and allergens (Bennett and Klich, 2003). Five classes of mycotoxins are major concern in animal husbandry, namely aflatoxins, trichothecenes, zearalenone, ochratoxins, and fumonisins (Schatzmayr *et al*., 2006). In respect to *Aspergillus* toxins, only ochratoxin is potentially as important as the aflatoxins, meanwhile the kidney is the primary target studied and is most likely toxic to humans, and had the longest half- life for its elimination of any of the *Aspergillus*,

Penicillium and *Fusarium* species (Creppy, 1999). Citrinin is hepatonephrotoxic and implicated in disease outbreaks in animals and humans (Xu *et al*, 2005). Scott (1994) Studied the mycotoxins elaborated by these fungi include but not limited to ochratoxin A, citrinin, patulin, roquefortine C, verrucosidin, penicillic acid A and cyclopiazonic acid. Nagy *et al*., (2006) observed mycotoxins analysis of grains revealed the occurrence of aflatoxins B_1, ochratoxin A, cyclopiazonic acid and citrinin.

Heavy metals as all metal compounds of atomic weight over 20.Due to toxicity of some heavy metals and possibility of environmental contamination, the potential of high risk is linked to Hg, Cd, As, Pb, as well as Cu, Zn, Sn, Cr, and Ni. (Dabrowski, 2004). Metals occur in all foodstuffs, of particular in the presence of toxic metals, which include lead, cadmium, arsenic and mercury (Morgan, 1999; Schulmacher *et al*., 1991 and Chung *et al*., 2008). Aluminum, also was detected in foods, but in excess, it can harm organ function (Renquan, 2004; Lopez *et al*., 2002 and Brown, 2001).

This research aimed to detect the presence of fungi, mycotoxins, pathogenic bacteria and the levels of cadmium, lead and aluminum in instant noodle samples (packets) that manufactured in some different countries which may affect on human consumption.

Materials And Methods

Collection of samples:

Forty-two samples of Instant noodle packets (fast food meals) were collected randomly from various markets at El-Riyadh, Saudi Arabia, which imported from different countries (Table 1). The samples were transferred to the laboratory and kept in a refrigerator until analysis. Each packet of instant noodle sample consist of:

Noodles

Wheat flour, edible vegetable oil (palm), sodiun carbonate, potassium carbonate, sodium polyphosphate, natural gum, riboflavin.

Seasoning Powder

Salt, sugar, flavor enhancers (E-62), shrimp flavor powder, yeast extract, garlic powder and chili powder. Net weight: 70 g.

Flavor differ from packet to another, it may be flavor of (onion ,chicken, vegetable, chicken curry, Toni yum, beef, tomato, special chicken and fried noodles).

Isolation of fungi: The fungal flora of the samples was detected by using the dilution plate method (Johnson *et al*., 1959). Sterilized distilled water at room temperature was used in case of uncooked noodles packets and after boiling water, simmer 5 minutes in case of cooking noodles packets .Two types of media were used:

Glucose-Czapeck's agar medium in which glucose (10 gm/L) replaced sucrose and Potato Dextrose Agar medium, chloramphenicol (20 ug/ml) and rose bengal (30 ppm) were applied to suppress bacterial growth (Smith and Dawson, 1944; Al-Doory, 1980). Ten plates were used for each cooked or uncooked sample (10 plates for each type of medium). The plates were incubated at 28°C for 1-2 weeks during which the developing colonies were counted, identified and the number was calculated per gm for each sample.

Identification of fungi:

The fungal isolates were identified whenever possible, in the original Petri-dish culture. When this was not possible, fungi were subcultured and stored for later identification, *Aspergillus* species were identified according to Raper and Fennell (1965) and Moubasher (1993). *Penicillium* species were identified according to Raper and Thom (1949) and Moubasher (1993). Dematiaceous Hyphomycetes were identified according to Ellis (1971, 1976) and other fungi were identified according to Domsch *et al.* (1980) and Moubasher (1993).

Mycotoxins analysis:

Extraction of toxins from the samples:

Twenty-five grams of each uncooked sample were shaked with 50 ml chloroform in 250 ml flask for 24 h. The defatted residue was re- extracted for another 24 h in shaker with 50 ml chloroform. Chloroform extracts were combined, washed with an equal volume of distilled water, dried over anhydrous sodium sulphate, filtered and then concentrated and left to dry. The dried materials were transferred to vials with small amount of chloroform, which was evaporated to near dryness (Zohri and Sabah Saber, 1992).

Detection of mycotoxins:

a- Thin layer chromatography (TLC):

The analysis of extract on TLC for detection of the presence of different mycotoxins was performed according to the standard procedures of Roberts and Patterson (1975) and Samson *et al.* (1995).

b- TLC conditions:

The solvent systems were applied according to Samson *et al.* (1995) as follows:

Chloroform: Acetone 90:10,
Chloroform: Methanol 97: 3,

Toluene: Ethyl acetate: Formic acid (90%) 5: 4: 1.

After developing and air drying, the TLC were examined under visible light, long wave UV light (356 nm) and short wave UV light (254 nm).

c- Visualizing and verification of secondary metabolites:

The following spray reagents were used:

Spray reagent 1: 0.5% p-anisaldehyde in ethanol and acetic acid/ conc. sulphuric acid 17: 2 :1 (most metabolites), (Scott *et al.*, 1970).

Spray reagent 2: 50% sulphuric acid in water (e.g.aflatoxin- B_1 and G_1 verruculogen : viridicatins; cyclopiazonic; streigmatocystin and T- 2 toxin), (Scott *et al.*, 1970 ; Eppley *et al.*, 1977).

Spray reagent 3: **FeCl3** in butanol and heating for 5 min. at 130°C (e.g. Aspergillic acid; kojic acid; penicillic acid; citrinin and verrucologen).

Spray reagent 4: 20% AlCl3 in 60% ethanol and heating for 5 min. at 130°C (e.g. penitrem A; trichothecenes B; streigmatocystin; gliotoxim and T-2 toxin). (Josofsson and Moller, 1979).

Spray reagent 5: **NH3** vapors for 1-3 min. (mycophenolic acid; xanthomegnin; viomellien; penicillic acid; ochratoxin A; kojic acid; citrinin and patulin).

3 - Identification of mycotoxins:

The developed plates were detected before and after spraying with the different reagents under short wave (254 nm) and long wave (356 nm) ultra violet irradiation. Mycotoxins were identified by comparison with appropriate reference standards after each of the following treatments:

a-Aflatoxins: Aflatoxins $B_1$and B_2 fluorescent green under long wave UV light (Chelkowski *et al.*,1974).The TLC was developed In a saturated Chamber with chloroform : acetone (9:1, V/V), then aflatoxins spots were served under long wave ultraviolet light.

b- Citrinin: Citrinin fluroscens lemon yellow under long wave light (Saito *et al.*, 1971).

c- Sterigmatocystin: The compound exhibits a dull brick red fluorescens under short wave UV light. Fluorescence change to yellow on spraying with aluminum chloride solution (20 g Al CI3 6H2O in 100 ml ethanol) and the plates heated at 100 ° C for 5 minutes (Josefsson and Moller, 1977).

d-Ochratoxin A: It fluorescent greenish- blue under long wave UV light and changes to deep blue on exposure to ammonia fumes(Nesheim *et al.* 1973).

e-Patulin: The toxin is observed on TLC plates as dark spot on a light background. It can be visualized as yellow fluorescent spot after spraying with P-anisaldehyde reagent, fluoresces pale blue under long wave UV light after exposure to ammonia fumes (Scott *et al.*, 1970).

f-Zearalenone: Zearalenone fluoresces blue-green under long

wave UV light and more greenish under short wave UV light and gives a green spot with 50 % sulphuric acid in methanol that quickly turns to yellow (Eppley, 1968 and Roberts and Patterson, 1975).

Bacteriological analysis of noodle samples:

A total of 42 instant noodle samples illustrated in Table (1) were analysed for the total plate count according to NMKL 1999, total coliform count NMKL 2004, Faecal coliforms count according to NMKL 2005, *Staphylococcus* count according to NMKL 1999, *Bacillus cereus* count according to NMKL 2003, *Salmonella* count according to NMKL 1999.

The method is summarized as following: Five grams of the sample were mixed with 45 ml of the relevant diluents from which tenfold serial dilutions were made down to the expected contamination level. Three ml from each dilution were inoculated each in one sterile Petri dishes in which relevant specific media was poured and after solidification the 3 plates were incubated at the relevant temperature for the relevant period. Nutrient agar for bacterial count and *Bacillus cereus* agar count. Wilson and Blair's medium for Salmonilla group. Baird and Parker agar for *Staphyllococcus*. A selective medium used, MacConkey"s medium. This medium is used for isolation of members of coliform, particularly faecal coliforms and E. coli. , lactose-fermenters such as *E. coli.* produce pinkish colonies, but non-lactose fermenters, such as *Salmonilla,* produce greyish. Lactose fermenting at 37°C for A Typical E.coli. and at 44°C for faecal coliforms, incubation period for 24 h or 48 h., Manitol salts agar used for isolation *Staphyllococcus* at 37°C for 24 h.

Determination the levels of Cadmium, Lead and Aluminum in total of 42 instant noodle samples Wet degradation method:

The method describes the determination of copper, zinc, sodium, potassium, magnesium, cadmiums, lead, aluminum, calcium and manganese in foods.

The food samples are usually digested in glass beakers using a mixture of nitric acid and. perchloric acid, then filtered into a volumetric flask and then brought to volume with deionizer water.

Sample preparation

1- Weight 2gm. of sample into a 500 ml. beaker

2-Add 25ml of concentrated HNO3, cover with a watch glass and boil genteelly for 5 min. to oxidize all easily utilizable material. Cool the solution and slowly add 10 ml of 70% HCLO4 .

3- Boil very genteelly until the solution is nearly colorless.

The instrument Optical Emission

Spectrometer Optima 2000 DV Perkin-Elmer was used for testing these metals (Barnes and Hsieh, 1995).

Results And Discussion

Mycoflora of instant noodles: Twenty-five species and one variety belonging to 9 genera were isolated from 42 samples of noodles before and after cooking of instant noodle products used which, were manufactured in 7 countries (Tables 1&2). On glucose-Czapeck's agar medium were isolated (5genera &17 species and 5 genera & 13 species respectively) before and after cooking at 28 ° C and on PDA medium (6 genera &17species+ 1variety and 6 genera & 15 species + 1 variety respectively) were isolated, before and after cooking noodle samples at 28 ° C. All these fungi were previously recovered from wheat grains (Moubasher *et al*., 1972), from contaminated stored and marketed millet samples (Makun *et al*. , 2007), from millet (Okoy, 1992), from mold infestations of starch (Panasenko, 1964), from moldy noodles (Xu *et al*., 2008 and Stajich , 2007),and from flour milling fractoins and end products (Berghofore *et al*.,2003).

Aspergillus was the most common genus on glucose-Czapek's agar medium,of uncooked noodle samples only, contributing 50% of the samples. But, it was isolated in moderate occurrence on glucose-Czapek's agar medium of cooked noodle samples and on PDA medium of cooked and uncooked noodle samples, comprising 31, 40.5 and 43% of the samples, respectively. Panasenko (1964), recorded that *Aspergillus* comprised about 30% of total fungi isolated from starch. In this study, 9 species and one variety of *Aspergillus* were recovered. Uncooked noodle samples was the richest samples in the population of *Aspergillus* species (6 spp + one variety) on PDA . *A. flavus* and *A. niger* were isolated on the two types of media used, but with different frequencies. *A. flavus* was recorded with moderate occurrence on glucose-Czapeck's agar medium of uncooked noodle samples, and in low occurrence of cooked noodle samples constituting 31 and 21.4 % of total samples respectively .While, it was isolated in rare frequency on PDA medium of cooked and uncooked noodle samples, respectively. *A. niger* appeared with low incidence (11.9% of the samples) on PDA medium of uncooked noodle samples and in rare frequency of cooked noodle samples and on glucose-Czapek's agar media of cooked and uncooked agar medium. The remaining *Aspergillus* species were isolated in low or rare occurrence (Table 2). Other species of *Aspergillus* were appeared on one type of media , for ex. On glucose-Czapecke's agar medium, *Aspergillus candidus*, while on

PDA medium, *A. flavus var. columnaris each* were estimated from cooked and uncooked noodle samples respectively. From uncooked noodle samples, *A.clavatus* and *A.terreus* were recorded on glucose-Czapek's agar, *while A.awamori* and *A.oryzae* were recorded on PDA medium. From cooked noodle samples, *A.versicular* was recorded on the two media respectively. The preceding *Aspergillus* species were isolated previously, but with variable densities and frequencies from ninety random grains (Nagy *et al.*,2006) from stored and marketed millet samples (Makun *et al.*,2007), from starch (Panasenco,1964), from moldy noodles (Xu *et al.*, 2008 and Sajich 2007) and from flour and raw noodles (Hino,1985).

Penicillium was isolated in moderate occurrence on glucose-Czapek,s agar medium from uncooked noodle samples and on PDA medium from cooked and uncooked noodle samples, comprising (33.3, 33.3 and 31% of total samples used), and in rare frequency from cooked noodle samples only on glucose –Czapek's agar medium. Panasenko (1964) reported that *Penicillium* comprised 25% of total fungi isolated from starch. Also, El-Kady *et al.*, (1986) recorded that *Penicillium* represent the second place in soybean seeds. Among 8 species of *Penicillium* recovered in low and rare frequncies in this study. *P. chrysogenum, P.citrinum, P. funiculosum* and *P.verrucosum* were recorded on the two types of media used from cooked and uncooked instant noodle samples,while *P.corylophilum* and *P.purpurogenum* were isolated on glucose-Czapeck's agar medium from uncooked instant noodle samples only. *P. aurantiogrisum* and *P. puberulum* appeared on all, except on glucose-Czapeck's agar medium from uncooked instant noodle samples. The uncooked noodle samples possessed high number (8 spp.) of *penicillium* and the lowest number (4 spp.) was estimated from cooked noodle samples each on glucose-Czapek's agar medium. *Penicillium* was one of the most common fungi, isolated from starch (Panasenko,1964) from marketed millet samples (Makun *et al.*, 2007), *P. citrinum, P. purpurogenum* and *P. verrucosum* were the most *Penicillium* species isolated from ninety random grains by (Nagy *et al.*,2006), *P. chrysogenum* was isolated from moldy noodles by Xu *et al.*,(2008) and Stajich (2007). Also, El-Kady *et al.*, (1986) reported that *Penicillium chrysogenum* was the most common *Penicillium* species isolated from soybean seeds. El-Maraghy (1989) isolated 4 species of *Penicillium* from chich-pea, soybean varieties and hybrids seed on glucose-Czapeck's agar medium at 28°C.

Cladosporium was isolated in low frequency on glucose-

Czapek's agar medium from cooked and uncooked noodle samples and on PDA medium from cooked noodle samples but it was recorded in rare frequency on PDA medium from uncooked noodle samples. It was represented by two species namely *C. cladosporioides* and *C. sphaerospermum*. *Cladosporium* was recovered, but with variable densities and frequencies, from flour milling and end products (Berghofer *et al.*, 2003), from soybean seeds by El-Kady *et al.*, (1986) and El- Maraghy (1989). The remaining species (*Emericella nidulans*, *Rhizopus stolonifer*, *Stachybotrys chartarum* and *Trichoderma viride*) were isolated in rare frequencies on PDA medium only of cooked or uncooked noodle samples, while *Alternaria alternata* and *Eurotium amestelodami* were isolated on glucose-Czapeck's agar medium only from cooked and uncooked noodle samples (Table 2).

The preceding species were previously isolated, but with variable densities and frequencies, from wheat grains by Moubasher *et al.*,(1972), from soybeen seeds by El-Kady *et al.*, (1986) and El-Maraghy(1989), from starch by Panasenko (1964), from random grains by Nagy *et al.*, (2006), from marketed millet samples by Makun *et al.*, (2007). James *et al.*,(2005) reported that the preservation of foods by drying is based on the fact that microorganisms and enzymes need water in order to be active .In preserving foods by this method, one seeks to lower the moisture content to a point where the activities of food spoilage and food-poisoning microorganisms are inhibited. Also, Panasenko (1964) observed the high incidence of mold infestations of starch was caused by starch producers' praetic of using frozen and partially spoiled potatoes. Kershen(2006) reported that using the authority to establish definitions and standards of identity for food, 28 FDA required the addition of specified amounts of folate to certain "enriched" foods specifically enriched macaroni and noodle products. Finally, Kershen (2006) recorded that the court would need to look at the contrast in additional light of the express and implied warranty provisions, of the Uniform Commercial Cod (UCC).

Natural occurrence of mycotoxin in instant noodles samples

Thin layer chromatographic analysis of chloroform extracts of 42 instant noodle samples showed that one instant noodle sample only No (3) of Switzerland product was contaminated with citrinin at concentration of 2 ppm. Natural occurrence of citrinin in different substrates was previously found in corn and silage at concentrations of 2-3 ppm (=2000-3000 ug / kg) (Chalam and Stahr, 1979) and in cereals used as feed for swine in districts of Denmark at 2 ppm. Scott *et al.*(1972) isolated citrinin from 13/29 heated Canadian grains

including samples of wheat, oats, barley and rye at concentrations ranged between 0.07 and 80 ppm. Citrinin is hepatonephrotoxic and implicated in disease outbreak in animals and humans as recorded by (Xu et al., 2005).

Hino (1985) reported that, the resulting of high risk of mycotoxins are consumed by humans this marks regulation of mycotoxins in our foods and imperative.

Bacteriological analysis of noodle samples according to NMKL (1999)

It was observed that all the instant noodle samples used were free from diseased bacteria (*Faecal coliforms*, *Staphylococcus*, *Bacillus cereus* and *Salmonella*), and the total bacterial count was zero. Simon *et al.*, (1997) recorded that most noodle samples were microbiologically acceptable and hokkien noodles produced the worst microbiological results and a small percentage were found to contain unacceptably high levels of pathogenic organisms.

The presence of cadmium, lead and aluminum in instant noodle samples tested

Cadmium, lead and aluminum were evaluated and the levels of these metals in total 42 instant noodle samples was demonstrated in Tables, (1 & 4). The cadmium concentration in each instant noodle samples was ranged between 0.043ppm. to o.o76 ppm. The highest concentration was obtained from the sample No (3 and 25) of Cup Sarap (Maggie) (Switzerland product) and the lowest one estimated from sample No (32) of Al Baker Noodles (Emirates product).Lead concentration was fluctuated between 0.121 ppm. and 1.143 ppm. The highest concentration was estimated from the sample No (18) of 2 Minute Noodles (Maggie) (Saudi Arabia product) and the lowest one obtained from the sample No (38) of Zidnee (Saudi Arabia product). While aluminum concentration was fluctuated between 1.284 ppm. and 11.250 ppm. The highest concentration appeared in the sample No (20) of Indomie (Saudi Arabia product), and the lowest one estimated from the sample No (30) of Hanna (Malaysia product) Tables (1 & 3). Kikuchi *et al.*, (2002) reported that cadmium concentration determined in ordinarily consumed foods and beverages in Japan was as follows: cereals 0.004 - 0.380 ug / g, seasoning and spices 0.01 - 0.06 u g / g, canned in syrup 0.01 ug/ g. Morgan (1999) recorded that metals occur in all foodstuffs which include lead, cadmium, arsenic and mercury, which are toxic metals. Also, Chuang (2007) demonstrated that the Japanese inventor of instant noodles, a snack that has sold billions of servings world wide since its launch, died at age 96, according to an official at Nissin Food Products Co., .

Dabrowski (2004) reported that the content of trace elements in foods depends on their concentration in the raw materials and additives used in food production, which may be transmitted to food from equipment used during food processing and from packaging material during storage. These trace elements include heavy metals, such as Hg, Cd, As, Pb, as well as Cu, Zn, Sn, Cr, and Ni. Morgan (1999) demonstrated that the toxic metal content of foods is influenced by many factors ranging from environmental condition and cooking techniques, although some foods can absorb metals of the cooking water is contaminated. Contamination may also, occur during kitchen preparation and storage. Chung *et al*., (2008) determined the dietary exposure of antimony, lead, mercury in food stuffs consumed by secondary school students in Hong Kong. The detection limits for antimony, lead, and total mercury were 1, 0.6 and 3 ug/ kg. Lopez *et al*., (2002) studied aluminum levels in convenience and fast foods in vitro and the detection limit was 4.0 pg and the characteristic mass of 10.0 pg. Aluminum concentrations were detected in foods with a greater content of spices and aromatic herbs, pasta, certain vegetables and additives, and food packaged in all vessels. The absorbable fraction of al estimated with vitro assays was between 0.85 and 2.15%. Brown (2001) observed that all the noodles which contained chlormequat were made from wheat flour, which is likely to be the source of chlormequat hydrogen phosphide including aluminum, magnesium and zinc phosphide which widely used as fumigants. Aluminum phosphide used on a wide range of stored products including noodles, cereals and confectionery, and also a vertebrate control agent. Renquan (2004) recorded that aluminum is usually absorbed through the intestine and stomach and then deposited in the body, but, in excess, it can harm organ function. The early symptoms include weakness, depression, anxiety and memory loss. When it is serious, it can cause kidney failure, uremia, dementia and even Parkinson's disease if excessive amount are deposited in brain. SA JCN (2006) reported that cadmium able to provoke kidney- damage after long periods of exposure in food such as fish, sea food and rice. Franklin(2004) concluded that lead penetrates the protective blood-brain barrier and is proving to be a risk factor for Alzheimer's disease and senile dementia.

Table (1): Numbers, sources, and commercial names of instant noodle samples

No	Source	Name of product	No	Source	Name of product
1	S. Korea	Instant Cup Noodles	22	Saudi Arabia	Indomie
2	S. korea	Instant Cup Sarap(Maggi)	23	Saudi Arabia	Indomie
3	Switzerland	Instant Cup Sarap (Maggi)	24	Saudi Arabia	Indomie
4	Thailand	Yum Yum	25	Saudi Arabia	Indomie
5	Indonesia	Indomie	26	Saudi Arabia	Indomie
6	S. Korea	Instant Cup Noodles	27	Malaysia	Hanaa
7	S. Korea	Instant Cup Noodles	28	Malaysia	Hanaa
8	S. Korea	Instant Cup Noodles	29	Malaysia	Hanaa
9	Thailand	Yum Yum	30	Malaysia	Hanaa
10	S. Korea	Instant Cup Noodles	31	Malaysia	Hanaa
11	Indonesia	Indomie	32	Emirates	Al Baker Noodles
12	Saudi Arabia	2 Minute Noodles (Maggi)	33	Emirates	Al Baker Noodles
13	Saudi Arabia	2 Minute Noodles (Maggi)	34	Emirates	Al Baker Noodles
14	Saudi Arabia	2 Minute Noodles (Maggi)	35	Emirates	Al Baker Noodles
15	Saudi Arabia	Rich Mami Noodles	36	S. Korea	Shin Ramyun
16	Saudi Arabia	2 Manute Noodles (Maggi)	37	Thailand	Fantastic
17	Saudi Arabia	Rich Mami Noodles	38	Saudi Arabia	Zidnee
18	Saudi Arabia	2 Manute Noodles	39	Emirates	Toya
19	Saudi Arabia	Indomie	40	Saudi Arabia	Zidnee
20	Saudi Arabia	Indomie	41	Saudi Arabia	Zidnee
21	Saudi Arabia	Indomie	42	Emirates	Jenan

Table(2): Number of cases of isolation (NCI.out of 42 samples).occurrence remarks(OR).and percentage counts (calculated per 42 samples) of fungi grew on glucose- Czapek's agar and potato- dextrose agar(PDA) media at 25°C of cooked and uncooked instant noodle samples

Genera & Species	Glucose-Czapek's agar				PDA			
Cooked & Uncooked Noodles	Cooked		Uncooked		Cooked		Uncooked	
Number of cases of isolation & %	NCI&OR	%	NCI &OR	%	NCI&OR	%	NCI&OR	%
Alternaria alternate (Fries) Keissler	1 R	2.4	1 R	2.4	0	0	0	0
Aspergillus	13 M	31	21 H	50	17 M	40.5	18 M	43
A.awamori Nakazawa	0	0	0	0	0	0	1 R	2.4
A.candidus Link	1 R	2.4	3 R	7.1	0	0	0	0
A.clavatus Desm	0	0	1 R	2.4	0	0	3 R	7.1
A.flavus Link	9 L	21.4	13 M	31	2 R	4.8	3 R	7.1
A.flavus var.columnaris Raper&Fennel	0	0	0	0	7 L	16.7	3 R	7.1
A.fumigatus Fresenius	1 R	2.4	0	0	4 R	9.5	2 R	4.8
A.niger (Van Tieghem)	1 R	2.4	3 R	7.1	3 R	7.1	5 L	11.9
A.oryzae (Ahlb) Cohn	0	0	0	0	0	0	1 R	2.4
A.terreus Thom	0	0	1 R	2.4	0	0	0	0
A.versicolor (Vuill) Tiraboschi	1 R	2.4	0	0	1 R	2.4	0	0
Cladosporium	5 L	11.9	5 L	11.9	4 R	9.5	8 L	19
C.cladosporioides (Fries) deVries	3 R	7.1	3 R	7.1	3 R	7.1	5 L	11.9

Table(2): Continue

Species	Glucose-Czapek's agar				PDA			
Cooked & Uncooked Noodles	Cooked		Uncooked		Cooked		Uncooked	
Number of cases of isolation & %	NCI&OR	%	NCI &OR	%	NCI&OR	%	NCI&OR	%
C.sphaerospermum Penz	2 R	4.8	2 R	4.8	1 R	2.4	3 R	7.1
Emericella nidulans (Idam) Lemin	0	0	0	0	1 R	2.4	0	0
Eurotium amstelodami Mangin	1 R	2.4	1 R	2.4	0	0	0	0
Penicillium	4 R	9.5	14 M	33.3	14 M	33.3	13 M	31
P. aurantiogriseum Diercks	0	0	2 R	4.8	1 R	2.4	1 R	2.4
P. chrysogenum Thom	1 R	2.4	3 R	7.1	4 R	9.5	2 R	4.7
p. citrinum Thom	1 R	2.4	1 R	2.4	3 R	7.1	4 R	9.5
P. corylophilum Diercks	0	0	1 R	2.4	0	0	0	0
P.funiculosum Thom	1 R	2.4	2 R	4.8	2 R	4.8	2 R	4.8
P. puberulum Bainer	0	0	1 R	2.4	1 R	2.4	2 R	4.8
P.purpurogenum Stoll	0	0	2 R	4.8	0	0	0	0
P.verrucosum Thom	1 R	2.4	2 R	4.8	3 R	7.1	2 R	4.8
Rhizopus stolonifer (Ehrenb.) Lindt	0	0	0	0	4 R	9.5	2 R	4.8
Stachybotrys chartarum (Ehrenb ex Lindt) Hughes	0	0	0	0	0	0	1 R	2.4
Trichoderma viride Pers. ex S.F.Gray	0	0	0	0	1 R	2.4	1 R	2.4
Number of genera	5		5		6		6	
Number of species & varieties	13		17		15+1		17+1	

Occurrence remarks (OR)

H: High occurrence: between 21- 42 cases, M: Moderate occurrence between 10-20 cases, Low occurrence between 5- 9, R: Rare occurrence between 1- 4 cases.

Table (3): Cadmium, Lead and Aluminum concentrations in instant noodle samples

Sample no.	Cadmium (ppm)	Lead (ppm)	Aluminum (ppm)
1	0.055	0.182	5.784
2	0.065	0.174	5.541
3	0.076	0.178	3.364
4	0.050	0.237	5.330
5	0.059	0.176	9.460
6	0.056	0.153	6.799
7	0.052	0.185	4.700
8	0.058	0.157	2.880
9	0.058	0.144	5.720
10	0.053	0.139	7.214
11	0.061	0.157	7.390
12	0.052	0.125	2.679
13	0.066	0.141	4.245
14	0.054	0.153	5.209
15	0.074	0.136	4.603
16	0.045	0.122	4.314
17	0.068	0.149	3.641
18	0.048	1.143	5.509
19	0.062	0.147	8.872
20	0.061	0.149	11.250
21	0.063	0.163	6.583
22	0.049	0.147	3.504
23	0.051	0.135	3.456
24	0.055	0.154	6.209
25	0.076	0.176	3.399
26	0.053	0.167	7.446
27	0.057	0.176	4.568
28	0.050	0.143	3.227
29	0.055	0.187	5.588
30	0.054	0.157	1.284
31	0.050	0.164	3.249
32	0.043	0.131	6.553
33	0.063	0.155	6.872
34	0.062	0.134	2.147
35	0.046	0.140	5.148
36	0.064	0.134	5.572
37	0.054	0.154	4.541
38	0.048	0.121	4.648
39	0.061	0.130	7.499
40	0.056	0.153	2.238
41	0.060	0.139	4.098
42	0.058	0.149	9.379

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الكائنات الفطرية والسموم الفطرية والعناصر الثقيلة من الشعيرية سريعة التحضير بالمملكة العربية السعودية

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جمعت 42 عينة شعيرية سريعة التحضير (الوجبات السريعة) من العديد من السوبر ماركت المختلفة بالرياض بالمملكة العربية السعودية وتم الكشف عن وجود كلاً من الفطريات والسموم الفطرية والبكتيرية الممرضة والكادميوم والرصاص والالومونيوم لتحديد مدى امنها للاستهلاك البشرى. اوضحت النتائج وجود 25 نوعا بالاضافة الى صنفا واحدا تنتمى الى تسعة اجناس من الفطريات تم عزلها على الاوساط الغذائية تشابكس جلوكوز وبطاطس ديكستروز أجار.

تم عزل ثلاثة أجناس من الفطريات بتعداد مختلف من كلتا الوسطين الغذائيين المستخدمين من الشعيرية المطهية وغير المطهية فى هذه الدراسة. كانت فطرة الاسبرجيللس ممثله بحوالى (41,5 – 50%) والبنسيليوم (16,7 – 34,2%) والكلادوسبوريام (9,8 – 20,8%) كما تم عمل استخلاص للسموم الفطرية المتواجدة فى العينات المختلفة من الشعيرية وباستخدام طريقة التحليل الكروماتوجرافى بالطبقة الرقيقة ثبت تلوث عينة واحدة فقط من الشعيرية بالسترينين.

تم تحليل عينات الشعيرية بكتريولوجيا باستخدام (NMKL) وقد اتضح ان جميع العينات خالية تماما من البكتيريا الممرضة.

كما تم تحليل عينات الشعيرية لتحديد مدى تركيز عناصر الكادميوم (0,076جزء/مليون) و الرصاص (0,143 جزء/مليون) والالومونيوم (11.250 جزء/مليون).