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RESEARCH ARTICLE

AWARENESS OF PHARMACISTS TOWARDS ASPARTAME SIDE EFFECTS IN KHARTOUM CITY, SUDAN

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ABSTRACT

Objective: Aspartame (or APM) is the name for an artificial, non-saccharide sweetener used as a sugar substitute in many foods and beverages. Aspartame is the methyl ester of a phenylalanine/aspartic acid dipeptide. Aspartame is an artificial sweetener. It is 200 times sweeter than sugar in typical concentrations, without the high-energy value of sugar. Aim of current study was to study the awareness of pharmacists about aspartame side effects.

Materials and methods: This study was carried in greater Khartoum, questionnaire for pharmacists to see the consumption and the awareness of them to these interactions during the period from September 2014 to November 2014.Study was conducted among practicing pharmacists. A pre designed and tested questionnaire were used for each category to collect the data. From the hospitals manager.

Results: 32% were aware of the number of aspartame products. Pharmacists when asked how many patients purchase aspartame products per day, answers showed that 74.5% ranged between 1-10 patients per day, About pharmacist's expectations to develop side effects due to aspartame, use regularly showed that 75% agreed that it would. pharmacists claimed that aspartame can or worsen a certain list of some diseases in which that diabetes represented 30%, Alzheimer's 28% , attention deficit disorder 17.3% , psychological disorders.

Conclusion: The majority of community pharmacists expect side effects can be developed due to aspartame regular use by patients but majority didn't know what are the exact side effects and the exact diseases that can be worsened when using aspartame.

Keywords: Aspartame, Awareness, Pharmacists, Sudan.

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INTRODUCTION

Aspartame (or APM) is an artificial sweetener, non-saccharide, methyl ester of a phenylalanine/aspartic acid dipeptide, used as a sugar substitute in many foods and beverages was first synthesized in 1965, approved in 1980 bythe United States Food and Drug Administration and its safety subjected to several political and medical controversies since it's approved[1,2] discovered accidentally by chemist James M. Schlatter[3,4]. Composed of methyl ester of the dipeptide of natural amino acids, L-aspartic acid and L-phenylalanine**,** manufactured by using a modified variation of *E. coli*. Aspartame can generate methanol under hydrolysis in strong acidic or alkaline conditions and the peptide bonds hydrolysed under more severe conditions to free amino acids[1,2]. Aspartame in a small amount with a low caloric contribution (4 kilocalories per gram) produce 200 sweeter taste than sugar[3]. Aspartic acid, phenylalanine, methanol produced after ingestion of aspartate[5], further breakdown products including formaldehyde[6], known to have several detrimental effects on the human body[7], formic acid, and a DKP–Aspartyl phenyl alanine diketo piperazine[8]. A metabolite of aspartame inhibits angiotensin-converting enzyme as shown in studies[9]. Individuals with mood disorders are particularly sensitive to aspartame as shown in a study conducted by Northeastern[10]. Headache, neuropsychiatric or

behavioural symptoms, seizures, gastrointestinal symptoms, and hypersensitivity[16] or dermatological symptoms[10-13] are the most reported problems of aspartame. Aspartame carcinogenic effects focused upon tumours of the brain and bladder. Later epidemiological studies didn't indicate the presence of bladder cancer and a brain tumour in human, but the increasing number of them in the USA coincides with the use of aspartame[17]. In the area of interaction, aspartame raised prothrombin time in patients taking warfarin[13].

METHODS

A pre-designed and tested questionnaire was used in greater Khartoum to see the consumption and investigate awareness of practising pharmacists towards aspartame side effects during the period from September 2014 to November 2014. A self-reported structured questionnaire was divided into four sections: demographic characteristics (3 questions), questions assessing products containing aspartame in Sudan (2 questions), one question for the dispensing of aspartame and its products and section for aspartame side effects (5 questions). The purpose of the study was explained to participants before attending the survey. The participation of the study was voluntary and only those who are willing participated in the survey[15]. The data was collected, entered, cleaned and analyzed using SPSS software version 17.

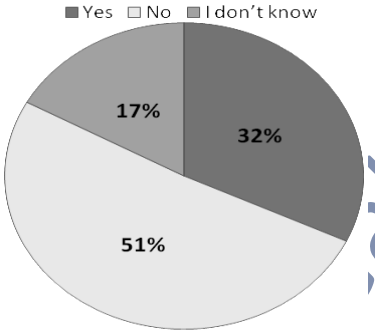

Figure 1: Frequency of pharmacists knowing the number of products containing aspartame in Sudan

RESULTS

60% from pharmacists in the study where female while others were male, 51% had 1-3 years of experience, 27% were 4-6 years' experience and 22% had more than 6 years' experience. 77% from participated were holding bachelor degree, 22% master degree holder and 1% were PhD. Only 32% of pharmacists knowing the number of products containing aspartame (Figure 1). Products containing aspartame as stated by pharmacists were Sussina, Doctor Sweet, Tropicana and some pharmacists stated that they were not remembered (Table 1). More than 70% from pharmacists in the study stated that dispensed aspartame products to 1- 10 patients (Table 2). Total 75% from pharmacists in the study expect side effects of aspartame when used regularly (Figure 2). 61% from pharmacists expect side effects from aspartame itself (figure 3) while 60% stated that side effect from metabolite (Figure 4).

Table 1: The products containing aspartame as stated by pharmacists

Products containing aspartame	Percent of pharmacists
Sussina	72
Doctor sweet	15
Tropicana	12
I can't remember	9
Diet	6
Aspartame	3
Sacrina sugar nil	3
Canditral	3
Sachets	3
Hermestas	3

The side effects expected from aspartame as stated by pharmacists were GIT (56.4%), cancer (53.6%), neurologic (50%) and endocrinological, metabolite side effects (50%) and psychological side effects (40%) (Table 3).

Table 2: Number of patients for whom aspartame products are dispensed per day

Number of pharmacists for whom aspartame products were dispensed/ day	Percent
1-10 patients	74.5
11- 29 patients	19.2
21- 30 patients	2.7
More than 30 patients	3.6

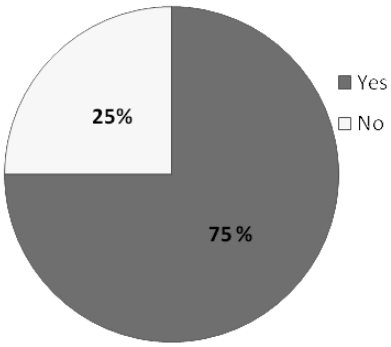

Figure 2: Expectation of side effects for aspartame when used regularly

Aspartame can mimic symptoms or worsen or cause diseases e.g. diabetes, Alzheimer, attention deficit disorder, multiple chemical sensitivities, psychological disorders and parkinsonism disease (> 30%, 28%, 17.3%, 15.8%, 15% and 12% respectively) (Table 4). The side effects expected from aspartame as stated by pharmacists were GIT (56.4%), cancer (53.6%), neurologic (50%) and endocrinological, metabolite side effects (50%) and psychological side effects (40%) (Table 3). Aspartame can mimic symptoms or worsen or cause diseases e.g. diabetes, Alzheimer, attention deficit disorder, multiple chemical sensitivities, psychological disorders and parkinsonism disease (> 30%, 28%, 17.3%, 15.8%, 15% and 12% respectively) (Table 4).

DISCUSSION

Aspartame has been and for a very long time an overlooked entity an additive in the daily lives of

patients, especially more that are seeking a change in lifestyle towards certain health goals such as weight control, diabetes control, to ebb on excessive sugar and carbohydrate intake, it is used as a sweetener in many products due to its low caloric value and this discussing and assessing its abundance within the population in form beverages or delicacy sweetener, so assessing the knowledge and awareness of pharmacists about its abundance within a range of products, side effects and consumption is an important matter.

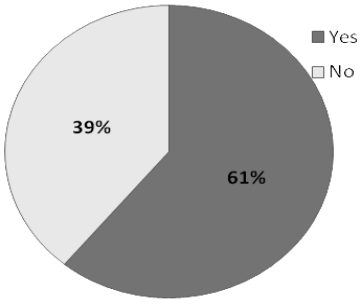

Figure 3: Expectation of side effects of aspartame itself

Current study revealed that 60% from pharmacists in the study where female while others were male, 51% had 1-3 years of experience, 27% were 4-6 years' experience and 22% had more than 6 years' experience. 77% from participated were holding bachelor degree, 22% master degree holder and 1% were PhD. Only 32% of pharmacists knowing the aspartame products available in the market and a large number 51% were not aware of them.

Table 3: Frequency of Side effect expected when using aspartame among study Population

Side effect expected when using aspartame as stated by the pharmacist	Percent
GIT	56.4
Cancer	53.6
Neurologic	50
Endocrine and metabolic	50
Psychological	40
Skin and allergies	40
Chest	40
Eye	22
Ear	20
Excessive thirst and hunger	20
Renal failure	0.9

The abundance of aspartame products worldwide stated by articles and studies of lendensmith said that aspartame can be found in over (6000) products often referred to as (sugar-free or diet products)[12]. Exemplified in breath mints, cereals, sugar-free gums, cacao mixes, coffee beverages, soft drinks and much more. Community pharmacists in Sudan could only name the obvious through mentioning alternative sweeteners, Sussina ™ being the most mentioned with a percentage of (72 %) and other sweeteners e.g. Doctor Sweet, Tropicana and Hermestas the least mentioned with a percentage of 3 %, these products are all used instead of sugar to sweeten beverages and taking delicacies realizing, non-mentioned were gums, candy sweets, drinks, or food rendering these overlooked and uncategorized the knowledge of community pharmacists as aspartame-containing products.

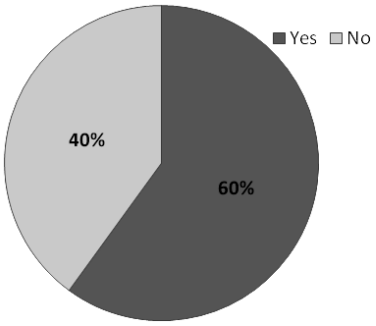

Figure 4: Expectation of aspartame metabolite side effects

Aspartame is a very abundant sweetener and low-calorie product is sometimes considered an aid to help weight loss this has rendered aspartame as a highly dispensed product besides its use by diabetic patients, 74.5% from community pharmacists have reported that up to 10 patients are dispensed aspartame per day and 3.6% of participants stated that more than 30 patients per day dispense it. Total 75% from pharmacists in the study expect side effects of aspartame when used regularly. 61% from pharmacists expect these side effects from aspartame itself while 60% stated that side effect from metabolite[15].

Table 4: The symptoms of diseases mimicked or worsened by aspartame can mimic symptoms, worsen, or cause the following disease among the study population

Diseases that aspartame can mimic symptoms, worsen, or cause them	Percent
Diabetes and its complications	30
Alzheimer disease	28
Attention deficit disorders	17.3
Multiple chemical sensitivities	15.8
Psychological disorders	15
Parkinson disease	12
Fibromyalgia	11
Arthritis	10
Epilepsy	7
Lupus	5
Multiple sclerosis	5

Due to the lack of clinical studies on the harmful effects of aspartame, community pharmacists and medical researchers have had to rely on their medical and scientific knowledge and the knowledge of pharmacological metabolites to determine the possible harmful effect caused by excitatory amino acids, phenylalanine and methanol, side effects mentioned by community pharmacists in this study were mainly GIT having the largest percentage of pharmacists (56.4%), 53.6% of them stated that cancer, neurological side effects stated by 50%, metabolite and endocrinological side effects stated by 50%, psychological side effects stated by 40% and 0.9% from pharmacists stated renal failure as the lower possible side effects, which were on par when received by the medical articles regarding

aspartame side effects[14]. Aspartame has also been linked to serious diseases and disease syndromes by mimicking symptoms or worsen or cause diseases, but it is also sometimes misdiagnosed because aspartame symptoms are not as apparent or obvious as said and usually next to other disease which could be misleading. Community pharmacists have mentioned some of these diseases, literature has mentioned disease such as psychological conditions, Alzheimer's, Parkinson's, ADHD and others as a serious syndrome and disease, the participants mentioned the worsening of diabetes 30%, Alzheimer's 28%, ADHD 17.3% and psychological disorders 15.8% alongside other conditions as a result of aspartame poisoning or intoxication. As stated by study tackling aspartame safety was done at Northeastern Ohio University College of Medicine, this study managed only to recommend discouragement of this sweetener in-patient with history of mood disorders, regarding the awareness survey done amongst Community pharmacists mentioned that 49% of them stated that aspartame users might develop neurological problems[16].

CONCLUSION

Almost 68% of community pharmacists didn't know the number of products that contain aspartame in the places they work. The majority of community pharmacists expect side effects can be developed due to aspartame regular use by patients but the majority didn't know what are the exact side effects and the exact diseases that can be worsened when using aspartame. In conclusion, more studies should be conducted to fortify the general concept of the poisonous hazard of aspartame and fill the gaps of knowledge found within the community, clinical and hospital pharmacists alongside other health professionals. Current study recommends that experimental researches must be done on aspartame side effects in man and animals to study safety profile. There must be a notification about aspartame side effects and diseases worsened by using aspartame to all doctors, pharmacists and patients.

AUTHOR'S CONTRIBUTION

Study conception and design was done by Ahmed Mustafa Khidir, Musab Hassan Dafaalla, Ali Awadallah and Eiman Abubakr Osman. Acquisition of data was done by Ahmed Mustafa Khidir and Musab Hassan Dafaalla. Analysis and interpretation of data was done by Ahmed Mustafa Khidir. Drafting of the manuscript was done by Ali Awadallah and Eiman Abubakr Osman. Critical revision was done by Mousnad.

CONFLICTING INTERESTS

Authors declare that no conflict of interests is associated with this work.

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