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EDITORIAL

DETECTION OF CHRONIC TYPHOID CARRIERS AMONG FOOD HANDLERS IN WAD MEDANI , GEZIRA STATE , SUDAN

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ABSTRACT

Typhoid fever remains a disease of major public health importance in the tropics. This cross sectional prospective descriptive study was carried out between July 2005 to July 2008 in Wad Medani Town. The objective of the study was to identify chronic typhoid carriers among food handlers in Wad Medani. To achieve this objective, Vi agglutination test was used to determine suggested typhoid carriers among food handlers then stool culture was performed on those with a positive Vi agglutination test. A questionnaire was designed to collect data from suggested typhoid carriers about hygienic practices during food handling and processing .

The collected data were reviewed and coded. Data were analyzed using SPSS versions 10.0 software for tabulation and statistical analysis.

The results showed that, ten percent of the examined food handlers were found positive typhoid carriers by Vi agglutination test, 48.5% of the suspected of typhoid carriers were found positive by stool culture, street vendors were more common among suspected typhoid carriers, all of whom had not received any health education about typhoid disease.

The study suggested the following recommendations: Regular health authority inspection visitor food handling personnel specially street vendors to exclude typhoid carriers among them, education and training course in good hygienic practices should be provided to all food handlers specially typhoid carriers by Food Control Department, Ministry of Health, Gezira State.

اكتشاف حملة ميكروب التيفويد المزمنين وسط متداولى الطعام بمدينة ود مدنى

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الملخص

تعتبر الحمة التيفية من الأمراض المهمة في الصحة العامة و التي مازالت باقية في الدول المدارية . هذه الدراسة المقطعية الوصفية نفذت في الفترة من يوليو2005 وحتى يوليو 2008 بمدينة ود مدني وقد كان الهدف منها هو معرفة حملة ميكروب التيفويد المزمنين وسط العاملين في تداول الطعام بمدينة ود مدني وللوصول لهذا الهدف أستخدم اختبار مستضد الفوعة (Vi) لتحديد حملة ميكروب التيفويد المزمنين وسط متداولي الطعام بمدينة ود مدني، ثم تم إجراء زراعة البراز وسط الحملة إيجابي اختبار مستضد الفوعة (Vi) كما تم تصميم استمارة الاستبانة

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لحملة ميكروب التيفويد ايجابي اختبار الفوعة (Vi) لمعرفة العادات الصحية أثناء تداول وتصنيع الغذاء.
تم جمع البيانات ومراجعتها وترقيمها ثم تحليلها عن طريق برنامج الحزمة الإحصائية للعلوم الاجتماعية لتبويبها وتحليلها إحصائيا.
توصلت الدراسة لعدد من النتائج شملت، إن 10 % من متداولى الطعام ايجابي اختبار مستضد الفوعة (Vi)، 48.5% من حملة ميكروب التيفويد بواسطة اختبار مستضد الفوعة (Vi) إيجابي زراعة البراز، الباعة المتجولين أكثر انتشاراً وسط حملة ميكروب التيفويد بواسطة اختبار مستضد الفوعة (Vi)، كل حملة ميكروب التيفويد ايجابي مستضد الفوعة (Vi) لم يتلقون تثقيف صحي في مجال مرض التيفويد.
هذه الدراسة اقترحت توصيات منها، الزيارات المنتظمة من قبل السلطات الصحية للتفتيش عن متداولي الطعام خاصة الباعة المتجولين لاستبعاد الحالات الحاملة للميكروب منها، الكورسات التعليمية والتدريبية من قبل قسم رقابة الأطعمة وزارة الصحة ولاية الجزيرة لمتداولي الطعام عن الممارسات الصحية الصحيحة وسط وحملة الميكروب.

INTRODUCTION

According to recent studies food borne diseases continue to be a major public health problem in the developed and developing worlds alike. Current statistics for food-borne illness in various industrialized countries showed that, up to 60% of cases may be caused by poor food handling techniques, and by contaminated food served in food service establishments. No valid data are available for most developing countries, but there are reasons to believe that, they have similar problems. A major risk of food contamination lies with the food handlers. Dangerous organisms present in or on, the food handler's body can multiply to an infective dose, given the right conditions, and come into contact with food, or surfaces used to prepare food. Since food handlers in large eating establishments cater for a larger number of people, they are epidemiologically more important than domestic food handlers in spreading food borne diseases. In view of above, a study was undertaken in health and educational institutions in Amritsar city with the objectives to identify salmonella carriers if any among the food handlers and to treat them, to detect the prevalence of intestinal parasites among them, and to study the personal hygienic measures observed by the food handlers .

Typhoid fever is a systemic infectious disease. It occurs in all parts of the world; it has declined a good deal in the developed countries due to improvement in sanitation and changes in the way of life. For Example, it has been brought very close to eradication in UK, with approximately one case per one million populations, which is perhaps the lowest incidence of typhoid in the world. The picture is depressing in the developing countries where typhoid fever is still a major health problem (Park, 2005).

In Sudan, widal test for *Salmonella typhi* O performed on 114 normal individuals from the Gezira area, where for O agglutination was found at 1:320 in 12 (10.5%) ,*Salmonella paratyphi* (BO) agglutinations was found in 6 (5.3%) at a titer of 1:160 (El-Shafie, 1991).

Materials and Methods

Study area:

Wad Medani town is the capital of Gezira state. It is located in the center of Gezira state, about (190) kilometer south to Khartoum and has a total area of (100 Km²). Wad Medani greater locality is divided into four administrative units namely, Medani central, Medani East, Nile East and North West. The total residential quarters of the town are forty with a total population of (423.863) according to (2008) census report. In the town there are a number of state Ministries , headquarter of the state Government and the head office of the Gezira scheme.

In Wad Medani town there are ten governmental hospitals, two private hospitals, thirty two health centers and a number of private clinics.

Study Design:

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245 food handlers were screened using a Vi agglutination test (serological test) to identify (the suggested typhoid carriers) among them. Stool culture was then performed to confirm the Vi agglutination test. and a questionnaire was designed to collect data from suggested typhoid carriers.

Food handlers sampling technique and size:

To determine the desired food handler size in Wad Medani town the following formula was used:

$$N = \frac{Z^2 \ Pq}{d^2}$$

Where:

N = Desired food handlers size.

Z = Standard normal deviation, set at (1.96) which correspond level of 95% confidence level.

P = Expected carrier prevalence (our assumption 20%).

q = 1-P.

d = degree of accuracy desired (0.05).

$$N = \frac{(1.96)^2 \text{ X } 0.2\ (1- 0.2)}{(0.05)^2} = 245$$

This sample was divided into eight clusters according to type of work. Mothers were represented by 50% of the desired food handler size. Each other cluster was represented as percentage of its weight in the other remaining 50% using simple random sampling method.

Table (1): The distribution of the sample according to clusters.

The clusters of food handlers in Wad Medani town (2005)

Type of work	Total food handlers	%	Sample size
Restaurants	225	5.7	14
Mothers	37453	50.0	122
Street vendors	640	15.4	38
Hotels	21	0.8	2
Butchers	450	11.0	27
Vegetables and fruit sellers	220	4.9	12
Milk sellers	235	6.1	15
Fish sellers	235	6.1	15
Total	39479	100	245

Source: The Department of Food Control, Ministry of Health Gezira state, (2005).

Blood sampling

Five ml venous blood sample have been collected from each food handler. Collected blood samples were centrifuged to obtain serum. Vi agglutination test was conducted according to Wilson and Miles (1975), Chitkara and Urquhart (1979) method using Kits made by (12076 Santa Fe Drive, Lenexa, ks 66215, USA) and eight dilutions as follows :

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1.8 ml of saline has been pipetted into the first tube in each row and 1.0 ml into every other tube. 0.2 ml of test serum has been added to the first tube of the appropriate row. The contents of tube one have been mixed and were transferred 1 ml to tube two. Finally each tube other than tube eight has been repeated. 1 ml from tube seven was discarded.

0.05 ml (one drop from the pipette provided) of Remal *Salmonella typhi* Vi suspension were added to each tube. The mixture was incubated at 37^0C for two hours and then has been refrigerated (2 to 8^0C) over night, (16 to 20 hours). Tested tubes were allowed to reach room temperature (18 to 30^0C) and examined for agglutination using back- lighting. The pattern of cells deposited on the bottom of the tube have been observed and the appearance of cells disturbed by gently flicking the base of the tube. The reaction has been compared with those seen in the control tube and in the dilution series of standard serum.

A titer of 1:10 or greater is normally considered a positive typhoid carrier.

Culture techniques

Stool culture

Stool (about 0.5 gm) was innoculated into sterile test tube containing about 5 ml of selenite F. broth medium and incubated at 37^0C over night. Then a loop full of this inoculum was sub-cultured on XLD medium and incubated over night at 37^0C. Non lactose fermenting colonies were confirmed as salmonellae by biochemical and serological tests.

Identification of *Salmonellae typhi*

Identification of *Salmonellae typhi* depended on Gram stain (Gram negative bacilli), oxidase test (negative), colonial morphology of the organism on the SS agar, group of biochemical tests and serological tests to confirm the identification.

RESULTS AND DISCUSSION

RESULTS :

Table (1): Prevalence of positive Vi agglutination test among food handlers (n=245).

Vi agglutination test	Frequency	Percentage %
Positive	26	10.61
Negative	219	89.39
Total	245	100

A total of (245) food handlers were examined serologically by Vi agglutination test to detect typhoid carries among them. A total of 26 (10.61%) were found positive by Vi antibodies.

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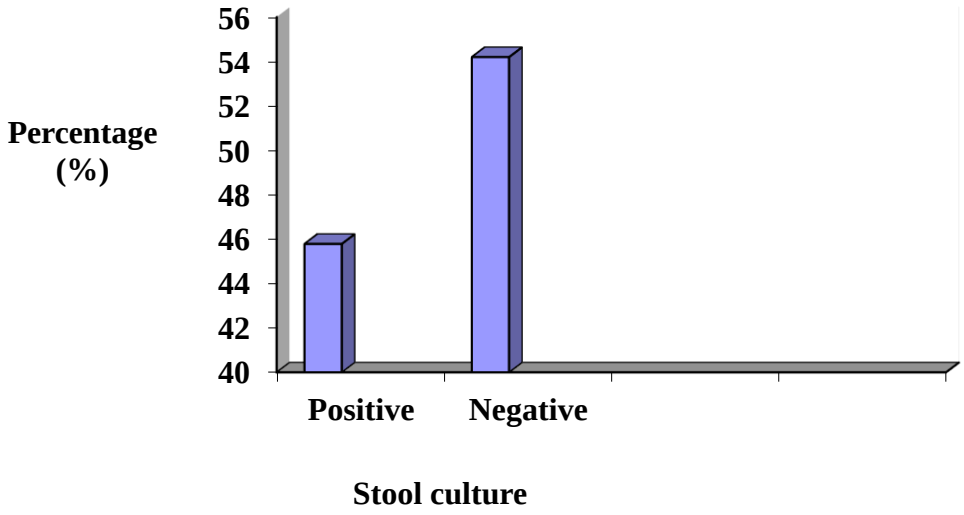

Fig.(1): Stool culture for positive Vi agglutination test typhoid carriers among food handlers in Wad Medani Town.

3 stool culture performed on 24 suggested typhoid carriers.
45.8% of carriers were found positive by stool culture.

Table (2): Age group of suggested typhoid carriers among food handlers in Wad Medani Town (n=26).

Age group	Frequency	Percentage %
19-29	7	26.9
30-40	10	38.5
41-51	6	23.1
52-62	3	11.5
Total	26	100

38.5% of carries were found in the age group (30-40) years indicating that the majority of suggested carriers are in their middle age.

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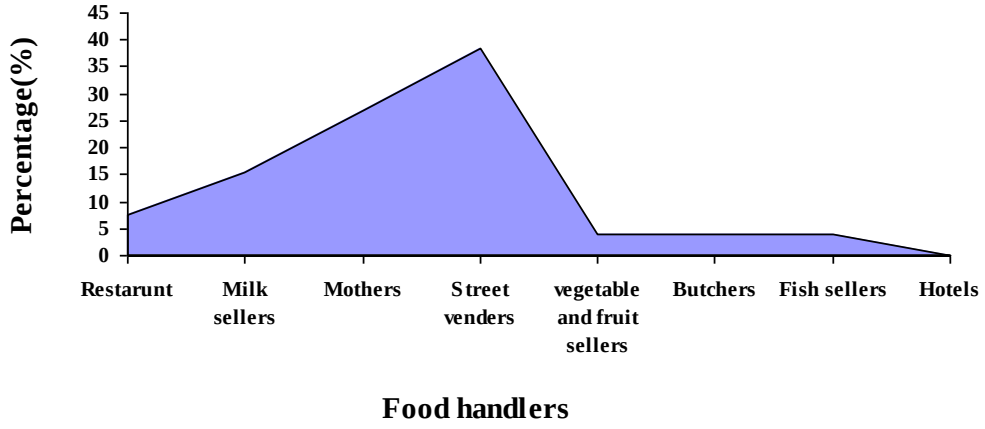

Fig. (2): Classification of suggested typhoid carriers among food handlers in Wad Medani Town.

Most of suggested carries were street vendors (38.5%), Mothers (26.9%) and milk seller 15.5%.

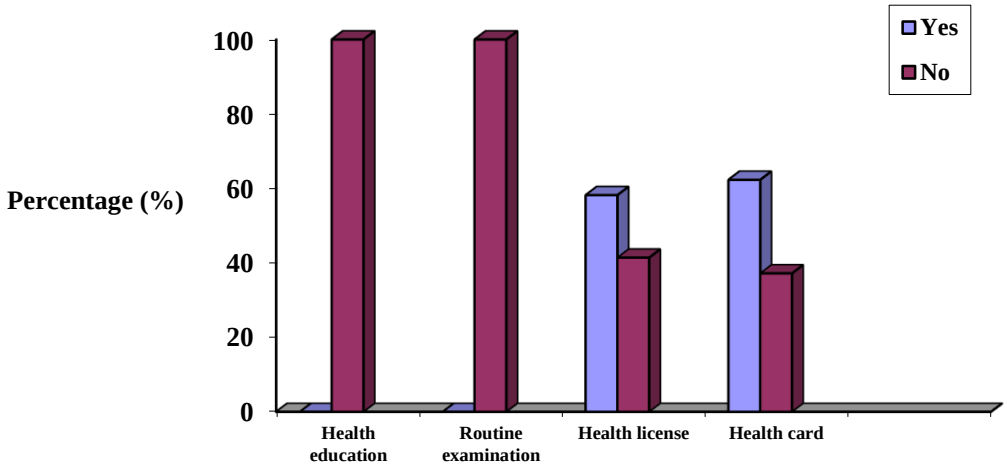

Fig. (3): Suggested typhoid carrier having health education, routine examination, health license and health card.

All suggested typhoid carriers had not received any health education about typhoid fever disease and all of them had no routine examination by stool culture.

Table (3): Knowledge, attitude and treatment of suggested typhoid carriers among food handlers in Wad Medani town (n=24).

Attitudes	Yes		No		Total	
	Fre.	%	Fre.	%	Fre.	%
Hand washing after using latrine	18	75	6	25	24	100
Hand washing with water	6	33.3	-	-		
Hand washing with water and soap	12	66.7	-	-	18	100
Hand washing before food preparation	17	70.8	7	29.2	24	100
Hand washing with water	15	78.9	-	-		

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Hand washing with water and soap	2	21.1	-	-	17	100
Vegetable washing	15	62.5	9	37.5	24	100
Knowledge about disease infection	9	37.5	15	62.5	24	100
Treatment						
House	2	8.3	-	-	24	100
In the hospital	15	62.5	-	-		
In the health centers	7	29.2	-	-		
Others	0	0	-	-		

62.5% of the interviewed suggested carriers found to be unaware about disease infection. 75% of suggested carriers showed positive attitude with respect to hand washing after using latrine. On the other hand 70.8% wash hand before food preparation.

Discussion:

Serological methods namely, Vi agglutination test and ELSIA are used for detecting of typhoid carriers. The method usually employed for the detection of carriers is Vi agglutination test. About 85% of chronic carriers have Vi antibodies in titers 1:5 or more. Persistence of Vi antibodies is a strong presumptive evidence for the infection (Je park and Park, 1986). This test is lacking in Sudan. Although, it's an expensive technique it is advised to make it available in the laboratories and accessible to Sudanese food handlers.

245 food handlers in Wad Medani Town were screened by Vi agglutination test to detect typhoid carrier. Using Vi agglutination test as screening method about ten percent of examined food handlers were found positive as a titer 1:10 was reported in (50%) of typhoid carriers. Then stool culture performed on 24 suggested typhoid carriers, 45.8% of carriers were found positive by culture of stool . The study results were nearly similar with Butter *et al.* (1992**)** who mentioned that, carriers status of typhoid fever in Amritsar city 214 food handlers enlisted in all health and educational institutions Laboratory examination of Vi agglutination reaction, 28 (13%) were Vi Reactors by agglutination test. The study also revealed that female carriers constituted 61.5% whereas male 38.5%. This result could be attributed to that females are responsible for preparing and making food. About 38.5% of carriers were found in the age group 30-40 years these result were compatible with that obtained by (Mermin *et al.*, 1999), WHO mentioned that, the chronic carrier state is most common among persons infected during middle age, especially women.

Most of carriers were reported in street vendors (38.5%), mother (26.5%) and milk sellers (15.5%). This study revealed that, street vendors were more common in carriers and this is highly significant in Wad Medani community because street vendors have no place, health license, health cards which were very difficult to control them. Street vendors, common in both developing and industrialized countries, also included in this group, and may present special problems related to their way of life and difficulties in determining whether they have complied with control measures (Luxemberjer *et al.*, 2001and Gasem *et al.*, 2001). These results are similar with study performed in Semarang city in Indonesia surrounding identified one of risk factors for typhoid fever. Eating outdoor at street food stall or mobile food vendor (OR = 3.86; 95% CI =1.30-11.48) and street vendors are very dangerous because they can not be provided with regulation of food handling like health license and health cards (Wilson, G.S. and Miles, A.A. (1975**)**.

The study had shown that, all of carriers (24) have not conducted routine examination for typhoid and this test is very important for any person who would like to work in food services. Health license was not found in 41.7% of food service place while 37.5 % of carriers had not health cards. These results indicated that, health authorities of food control for food handlers activities in Wad Medani Town are faced by some

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obstacles to able full control towards health standard of food handlers places and health of food handlers particularly for free of typhoid disease. In Egypt, according to the law of the Ministry of Health, number 786 for the year 1962 rearranged by the law number 144 for the year 1963, regarding preventive measures against infectious food born and water born disease, food handlers must undergo certain routine medical examinations and screening tests before they can be employed in food establishments or as vendors of foods. Health certificate is valid for only one year, and must be renewed through 30 days before the validity end-date **(**Park editors- Park's, 2003).

The present study stated that, positive attitudes towards hand washing after using latrine in 75% of carrier. However, 66.7% of above mentioned group used soap during washing. On the other hand, 70.8% washed hands before food preparation. These results effective positively on reduction of typhoid disease problem unless found defect in washing hand technique as Corales (2005) who found that proper procedure for hand washing included, wet your hands with warm water, apply soap and wash your hands for 20 seconds, rinse, and then dry your hands with a single-use paper towel. Positive hygienic practice of vegetable washing was reported in 62.5% of carriers. However, 75% of typhoid carriers heat food stored in refrigerator before using it. These result effective positively on occurrences of typhoid epidemic.

Conclusion:

First, ten percent of examined food handlers were found positive as a titer 1:10 was reported in (50%) of suggested typhoid carriers and nearly half of these suggested carriers were found positive by using stool culture. Majority of suggested typhoid carriers were females and most of them in the age group 30-40 years. Second, street vendors were more common among suggested typhoid carriers, and obviously, this is very dangerous on the behalf of Wad Medani community; and that is for the fact that they do not place, health license and health cards which were very difficult to control them. All of suggested typhoid carriers had not received any health education about typhoid disease.

References:

1. Chitkara, Y.K. and Urquhart, A.E. (1979). Fluorescent Vi antibody test in the screening of typhoid carriers. *Amer. J Clin. Path.*, 72, 87.
2. Corales, R.(2005). Typhoid Fever. Last date accessed: http://www.emedicine.com/MED/topic2331.htm
3. El-Shafie, S. and East Afr Med, J. (1991). The Widal test in a normal healthy population in the Sudan Apr; **68** (4): 266-9.
4. Luxemberger, C.; Chau, M.C.; Mai, N.L.; Wain, J.; Hien, T.T. and Simpson, J. (2001). Risk factors for typhoid fever in the Mekong Delta, southern Vietnam: a case control study. Trans. R. Soc. Trop. Med. Hyg.; **95:** 19-23.
5. Mermin, J.H.; Villar, R. and Carpenter, J.A. (1999). A massive epidemic of multi-drug resistant typhoid fever in Tajikstan associated with consumption of municipal water. *J. Inf Dis*.; **179:** 1416-22
6. Park, K. editors. Park's. (2005). Textbook of Preventive Medicine. 18th ed. Jabalpur: Ms Banarasidas Bhanot.
7. Wilson, G.S.;. Miles, A.A. (1975). *Guidelines for the control of infectious diseases* . 6th Ed., London, E. Arnold Pages 2024-2025.

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