

Dedication

**...To the soul of my father
Who worked hardly for us**

..To my dear mother

..To my husband & lovely kids

..To my brothers & my sisters

..To whom I love

Acknowledgment

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ABSTRACT

Over a period of 2 years (From January 2006 to January 2008), 710 faecal samples were collected from residents of two internally displaced persons camps, Khartoum State, with acute or chronic diarrhea, and investigated for bacterial, viral, and parasitic enteropathogens.

Specimens were collected from patients who were attending clinics (all age groups were included) using standard method, microbiological investigations were performed using conventional and molecular methods.

The results revealed that 77.5% of patients with diarrhea were infected with enteropathogens, among them 35.2% had a parasitic, 26.8% a bacterial, 13.9% a viral, and 1.5% had mixed infections.

Shigella spp. was the pathogen most frequently detected, accounting for 15.5% of all positive findings in the patients, followed by Rotavirus (14.8%), *Hymenolepsis nana* (13.4%), however, *Schistosoma mansoni* and *Cryptosporidium* spp. were the least detected pathogens (1.1% each). Most of patients affected with diarrhea were children under five years (46.5%), and Rotavirus was the most prevalent enteropathogen in this age group with 29.6% frequency rate, however it was *Shigella* spp. among adults, and children over 5years (18.3% both), and most of *Shigella* spp. were *S. dysenteriae* (42.5%).

Further characterization of identified Rotavirus isolates was done using real time polymerase chain reaction (RT-PCR), revealed that, they were type A (95.2%), and type C (4.8%).

Out of the total bacterial pathogens, high resistance was observed against amoxicillin (70.9%) then erythromycin (48.7%), and co-trimoxazole (45.2%). And the lowest resistance to cefuroxime (26.6%).

Most of the *Shigella* spp. isolates were sensitive to cefuroxime (65.5%), but high degree of resistance was observed against amoxicillin (73.6%). Most of the patients consumed untreated drinking water, depend on donkey carts as water source, live in very poor condition, they suffering from crowdnness, and had no disposal latrines; all of them were risk factors for acquiring diarrhea.

In conclusion, these results revealed that most of diarrhea cases in displaced camps were of parasitic etiology. The most affected group was children under five years. The most frequently identified pathogen was *Shigella* spp., and most of it were multidrug resistant. Rotavirus had big role in diarrhea, mainly type A especially among children under five years. Further research is needed to adapt and simplify interventions, and to explore novel diagnostics, vaccines, and therapies.

□□□□□□

على مدى سنتين (من يناير 2006 إلى يناير 2008)، تم جمع 710 عينة براز من المقيمين بمخيمات النازحين داخليا، بولاية الخرطوم، و الذين كانوا يعانون من الإسهال الحاد أو المزمن، وذلك بهدف التدقق من الممرضات المعوية البكتيرية والطفيلية و الفيروسية.

جمعت العينات من المرضى الذين ترددوا على عيادات (و ضم ذلك جميع الفئات العمرية)، باستخدام الطرق المخبرية القياسية المعتادة، و تم التدقق باستخدام الطرق التقليدية والجزئية. أظهرت النتائج أن 77.5% من المرضى الذين يعانون من الإسهال كانوا مصابين بأمراض معوية، منهم 35.2% حالات مرضية بالطفيليات و 26.8% بالجراثيم و 13.9% بالفيروسات، و 1.5% حالات مرضية مختلطة.

وكانت □□□□□□ هي الممرض المعوي الأكثر شيوعا، بما يمثل 15.5% من النتائج الإيجابية في جميع المرضى، وتلاه فيروس الروتا (14.8%) و □□□□□□□□□□ (13.4%)، و كانت كلتا شستسوما مانسوناي و الكربتوسبورديم الأقل ترددا (1.1% كل).

معظم المرضى المصابين بالإسهال هم من الأطفال دون سن خمس سنوات (46.5%)، وفيروس الروتا كان الممرض المعوي الأكثر شيوعا في هذه الفئة العمرية (29.6%)، ولكن كانت □□□□□□□□□□ بين البالغين والأطفال فوق خمس سنوات ((18.3% على حد سواء، ومعظمها كانت □□□□□□□□ □□□□□□ (42.5%).

تم عمل توصيف لفيروس الروتا الذي تم التعرف عليه، وذلك باستخدام تفاعل البلمرة المتسلسل الزمني، و كشف ذلك، عن نوع (95.2% A)، و نوع (4.8% C).

تم إجراء اختبار الحساسية تجاه المضادات الميكروبية لكل البكتيريا التي تم عزلها، و أظهرت النتائج وجود مقاومة عالية ضد أموكسيسيلين (70.9%) ثم اريثروميسين (48.7%)، و كوتريموكسازول (45.2%)، وأدنى مقاومة سيفروكسيم (26.6%).

أظهرت معظم سلالات □□□□□□□□□□ حساسية للسيفروكسيم (65.5%)، ولكن درجة عالية من المقاومة ضد أموكسيسيلين (73.6%).

معظم المرضى يعتمدون على معدات تجرها الدواب لجلب المياه، غير المعالجة، و يعيشون في حالة بيئة متردية صحيا، حيث يعانون من الازدحام السكاني، و لا توجد دورات مياه، و هذه تعتبر من عوامل اكتساب الإسهال.

خلصت نتائج الدراسة إلي أن اغلب حالات الإسهال بمخيمات النازحين تسببها الطفيليات، و معظم المرضى المصابين بالإسهال هم من الأطفال المصابين دون سن خمس سنوات، هي الممرض المعوي الأكثر شيوعا و قد أظهرت اغلبها مقاومة متعددة لمضادات الجراثيم. بصورة عامة وجد ان السيفروكسيم هو المضاد الأكثر فاعلية لكل البكتيريا المعزولة. و كان لفيروس الروتا دور هام كمسبب للإسهال خاصة النوع A و خاصة في فئة الأطفال دون سن خمس سنوات و هذا يدفع الباحثين لإجراء المزيد من الدراسات، لاكتشاف طرق تشخيصية جديدة و لقاحات و قائية، و أدوية علاجية.

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List of Abbreviations

WHO:	World Health Organization.
IDPs:	internally displaced persons.
RT-PCR:	Reverse Transcription – Polymerase Chain Reaction.
ORT:	Oral Rehydration Therapy.
UNICEF:	United Nations Children’s Fund.
CMR:	Crude Mortality Rate.
CDC:	Centre of Disease Control.
EPEC:	enteropathogenic <i>E. coli</i> .
VTEC:	vero-toxogenic <i>E. coli</i> .
EHEC:	Enterohaemorrhagic <i>E. coli</i> .
OR:	Odd Ratio.
API:	Analytical Profile Index.
ICT:	Immuno- chromatography test.

NCBI: National Center for Biotechnology Information.
NTC: Non Template Control.
ELISA: Enzyme Linked Immunosorbent Assay.