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Effect of Immunization in protection of different serotypes of Rota virus among immunized children with acute diarrhea in Khartoum state

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قال تعالى

{ وَقُلْ رَبِّ زِدْنِي عِلْمًا }

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To my family and friends great thanks and love...

Dedication

This research work is dedicated to my parents for their unlimited tangible support and encouragement.

** My brothers and sisters*

**My friends*

** Every Sudanese child*

** And everyone who wishing me success*

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Abstract

Rotavirus remains a leading cause of severe diarrhea in children worldwide, especially in developing countries where about 2000 children die each day from rotavirus-related gastroenteritis infection. The Global Alliance for Immunizations has ranked rotavirus as a priority for vaccine. To ensure the success of this, it is important to document the local strain(s) of rotavirus in circulation in various regions.

This study aimed to Serotype and genotype rotavirus that cause gastroenteritis among children below 5 years of age in Khartoum state. A cross-sectional hospital based study was conducted and a total of 200 Rota virus positive fecal specimen (150 from immunized and 50 non immunized children) were collected and analyzed during the year 2014 from pediatric hospitals in Khartoum state. The samples were screened for rotavirus strains using antigen based enzyme immune-sorbent assay (ELISA), genotyping was done by RT-PCR to determine rotavirus genotypes using genotype-specific primer sets targeting VP4 and VP7 genes.

Results from this study show that rotavirus infection is common in children of Age 2 months to one year. This study found that rotaviruses are in circulation

throughout the year, more cases detected during the dry and cold months of November and December. Prevalence was high among children aged one and two years. The common, globally prevalent strains, G1, G2, G3 and G9 accounted for 3.76%, 44.7%, 2% and 12% respectively in immunized children, While in the control group of non-immunized children Strain G1 accounted for 66% . G1[P8] was the common genotypic combination, accounting for 53.1% of infections in non-immunized children and 21.1% in immunized children. This indicates the value of vaccination in reducing the prevalence of this serotype. G2 p[4] was indicated still circulating among immunized population. Uncommon combination of genotype G3P [6], G2P [6], G1P [6] and G12P [8] were also detected after children's immunization.

This study concludes that there is wide strain diversity in rotaviruses circulating in Khartoum state. In addition, the decreasing incidence of G1 serotype after immunization indicated the positive impact of Rota Vaccine. However the presence of uncommon serotypes circulating after immunization is considered failure of vaccine and may lead to epidemics if not controlled.

ملخص الدراسة

لا يزال فيروس الروتا هو السبب الرئيسي للإسهال الحاد لدى الأطفال في جميع أنحاء العالم، وخاصة في البلدان النامية حيث يموت نحو 2000 طفل كل يوم من عدوى التهاب المعدة والأمعاء المرتبطة بفيروس الروتا. التحالف العالمي من أجل التحصين قد صنفت فيروس الروتا كأولوية لقاح. لضمان نجاح ذلك، فمن المهم توثيق السلالة المحلية من فيروس الروتا في التداول في مختلف المناطق. هدفت هذه الدراسة إلى تحديد النوع المصلي والجيني لفيروس الروتا الذي يسبب التهاب المعدة والأمعاء لدى الأطفال أقل من 5 سنوات من العمر في ولاية الخرطوم. وقد أجريت الدراسة في مستشفيات الأطفال تم جمع 200 عينة براز إيجابية وحللت (150 أطفال محصين و50 طفلاً غير محصين) خلال العام 2014. تم فحص العينات للسلالات فيروس الروتا باستخدام مستضد أساس انزيم المناعية بالأنزيم (ELISA)، وقد تم

التنميط الجيني بواسطة RT-PCR لتحديد المورثات فيروس الروتا باستخدام مجموعات (primers) النمط الجيني محددة تستهدف الجينات VP4 و VP7.

نتائج هذه الدراسة تؤكد تأثير الهائل من عدوى فيروس الروتا هو شائع في الأطفال من سن 2 أشهر حتى سنة واحدة. وجدت هذه الدراسة إلى أن الإصابة بفيروس الروتا كانت طوال العام ولكن حالات الإصابة العالية تم الكشف عنها خلال الأشهر الجافة والباردة من نوفمبر تشرين الثاني وديسمبر كانون الأول. وكان الانتشار عالي بين الأطفال الذين تتراوح أعمارهم سنة لسنتان. تم عزل سلالات موزعة عالميا G1، G2، G3 و G9 عن 3.76%، 44.7%، 2% و 12% على التوالي في الأطفال المحصنين، بينما المجموعة الضابطة من الأطفال غير المطعمين سجلت لدراسها علي حدوث 66 G1%. كان [P8] المزيج الوراثي الأكثر شيوعا في الأطفال، وهو ما يمثل عدوى 53.1% في الأطفال غير المحصنين و 21.1% في الأطفال المحصنين مما يدل على قيمة التطعيم للحد من هذا النمط المصلي G2 لا يزال تداولها بين الاطفال المطعمين. كما تم عزل مزيج نادر من النمط الجيني [6] G3P، [6] G2P، [6] G1P و [6] G12P بعد تحصين الأطفال. وتخلص هذه الدراسة أن هناك تنوع سلالة فيروس الروتا في ولاية الخرطوم. وبالإضافة إلى ذلك، خفض معدل الإصابة المصلي G1 بعد أشار التحصين الأثر الإيجابي للقاح. ولكن وجود الأنماط المصلية شائعة تداولها بعد يعتبر التحصين فشل لقاح الروتا وربما يؤدي إلى انتشار الأوبئة في حال عدم السيطرة.

Abbreviation	Full Name
ACIP	Advisory Committee on Immunization Practices
bp	Base pairs
CDC	Centers for Disease Control and Prevention
cDNA	Complementary DNA
CVP	Children's Vaccine Program
DNA	Deoxyribonucleic acid
dNTPs	Deoxynucleoside-5' triphosphate
DEPC	Diethylprocarbonate
dsRNA	Double stranded Ribonucleic acid
EIA	Enzyme immunoassay
ELISA	Enzyme-linked immunosorbentassa

EM	Electron microscopy
EPI	Expanded Program on Immunization
GAVI	Global Alliance for Vaccines and Immunization
HRP	horseradish peroxidase
LA	Latex agglutination assay
PAGE	Polyacrylamide gel electrophoresis
PCR	Polymerase chain reaction
RNA	Ribonucleic acid
NSP	Nonstructural protein
RT-PCR	Reverse transcription polymerase chain reaction
RRV	Rhesus rotavirus
VP	Viral proteins

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