

بسم الله الرحمن الرحيم

قال الله تعالى:

(إِنَّمَا أَمْرُهُ إِذَا أَرَادَ شَيْئًا أَنْ يَقُولَ لَهُ كُنْ فَيَكُونُ) (82)، فَسُبْحَانَ الَّذِي يَدِيهِ مَلَكُوتُ كُلِّ شَيْءٍ وَإِلَيْهِ تُرْجَعُونَ) (83)

سورة يس الآيات 82-83

يَا أَيُّهَا الَّذِينَ آمَنُوا إِذَا قِيلَ لَكُمْ تَفَسَّحُوا فِي الْمَجَالِسِ فَافْسَحُوا يَفْسَحَ اللَّهُ لَكُمْ ۖ وَإِذَا قِيلَ انشُزُوا فَانْشُزُوا فَانْشُزُوا يَرْفَعَ اللَّهُ
الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ ۗ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ (١١)

سورة المجادلة الآية 11

أَمَنْ هُوَ قَانَتْ أَنَاءَ اللَّيْلِ سَاجِدًا وَقَائِمًا يَحْذَرُ الْآخِرَةَ وَيَرْجُو رَحْمَةَ رَبِّهِ ۖ قُلْ هَلْ يَسْتَوِي الَّذِينَ يَعْلَمُونَ وَالَّذِينَ لَا
يَعْلَمُونَ ۚ إِنَّمَا يَنْذَكُرُ أُولُو الْأَلْبَابِ (٩)

سورة الزمر الآية 9

هُوَ الَّذِي جَعَلَ الشَّمْسُ ضِيَاءً وَالْقَمَرَ نُورًا وَقَدَرَهُ مَنَازِلَ لِنَعْلَمُوا عَدَدَ السِّنِينَ وَالْحِسَابِ ۚ مَا خَلَقَ اللَّهُ
۞ إِلَٰهَ إِلَّا بِالْحَقِّ ۚ يُفَصِّلُ الْآيَاتِ لِقَوْمٍ يَعْلَمُونَ (٥)

سورة يونس الآية 5

(شَهِدَ اللَّهُ أَنَّهُ لَا إِلَٰهَ إِلَّا هُوَ وَالْمَلَائِكَةُ وَأُولُو الْعِلْمِ قَائِمًا بِالْقِسْطِ ۚ لَا إِلَٰهَ إِلَّا هُوَ الْعَزِيزُ الْحَكِيمُ) (18)

سورة آل عمران الآية 18

Dedication

To my lovely parents

My dear husband

My sisters and brothers

My friends and colleague

My beautiful flowers Reem, Ruba, and Leen

Who stand behind me and support me until I complete this work

Acknowledgment

First praise be to God who supply me strength and patience to accomplish this work. and all thanks and appreciation to Dr Malik Hassan Ibrahim Mustafa my supervisor who directed and stood beside me and faced my continuous consultation with patience to completed this work as required.

Special thanks and appreciation to those who sent to me by Allah mercy to start this work, Dr Hassan Sidique, Dr Mahuddin , and Dr. Mahmoud Algary

Eventually my grate full to Badruddin Mohamed , Osman Ahmed, and Mohammed Ahmed in Algedaref teaching hospital who have been very helpful during this work.

Abstract

This study is a descriptive, cross-sectional analytical study aimed to determine the frequency of sickle cell trait among relatives of sickle cell anaemia patients in Al-Gadaref state –Sudan, during April to July 2012. Seventeen families with one hundred and fourteen individuals, with different ethnic descents were involved. 56 Males (49.1%), and 58 Females (50.9%), compare to 30 healthy person as a control group. 2.5 ml of venous blood was collected from each person in EDTA container with care and adequate safety to ensure the reliability of the result, CBC, ESR, sickling test, and Hb electrophoresis were carried out. The data showed that (67%) of the study population were positive and (33%) were negative for sickling test. The results of hemoglobin electrophoresis showed high frequency of sickle cell trait (66.7%) among the study population followed by HbAA (24.6%), HbSS (5.3%), HbAC (1.8%), and HbSC (1.8%). The highest distribution of sickle cell trait was found among Hawsa tribe (36.8%), followed by Fulani (26.3%), Bargo Selehab (15.8%), Hawazma (11.4%) and Fore (9.6%). Most individuals in our study their parent coming from a single ethnic descent (98.24%) which reflect the high degree of consanguineous marriage, thus a high risk of augmenting the sickle cell gene. The mean of Hb level, TRBCs, and PCV in patient with sickle cell anemia were (7.4g/dl),($2.7 \times 10^6/\mu\text{l}$),(22.6%) respectively and in HbSC were (9 g/dl),($3.4 \times 10^6 \mu\text{l}$),(27%), respectively which are lower than in sickle cell trait that showed (12.5g/dl), ($4.6 \times 10^6/\mu\text{l}$), (38.2%) respectively, and HbAC that showed (13.5 g/dl),($4.6 \times 10^6/\mu\text{l}$),(41%) respectively which were not significantly differ than control,who showed (12.4g/dl),($4.4 \times 10^6/\mu\text{l}$),(37.3%) respectively. The result of MCV, MCHC, and MCH, showed no significant difference between sickle cell trait (82.9fl) ,(32.7g/dl), (27.5pg), respectively, sickle cell anemia that showed (86.5fl), (33.3g/dl), (28.2pg), severally, HbSC

which showed, (79fl), (33mg/dl), (26.6pg), sequentially, HbAC that showed (88.6fl), (33.1g/dl), (29pg) , severally, and HbAA that showed (83.6fl), (32.3g/dl), (28.1pg), respectively. The total leukocytes, was significantly elevated in sickle cell anaemia ($12.1 \times 10^3/\mu\text{l}$), and HbSC that showed ($8.5 \times 10^3/\mu\text{l}$), when compared with sickle cell trait ($5.1 \times 10^3/\mu\text{l}$), HbAC that showed, ($3.6 \times 10^3/\mu\text{l}$), and HbAA that showed ($4.5 \times 10^3/\mu\text{l}$), no significant difference between the three group in their value. Platelets count was higher in HbSS ($376 \times 10^3/\mu\text{l}$) and lower in HbSC ($160 \times 10^3/\mu\text{l}$) when compared with HbAS ($230 \times 10^3/\mu\text{l}$), HbAC ($235 \times 10^3/\mu\text{l}$) and HbAA ($237 \times 10^3/\mu\text{l}$) which are not differ in their values. The mean of ESR was higher in HbSS (42.3mm/h) and HbSC (95mm/h) than in Hb AS (21mm/h), HbAC (8mm/h) and HbAA (11mm/h). These results concluded that sickle cell trait is highly frequent among the relatives of sickle cell anaemia patients in study area and could be capable of spreading the disease further due to high degree of consanguineous marriage, population unawareness, closed societies and lack of medical counselling, and also provide an insight sickle cell anaemia was found to be predominant among African immigrant tribes.

ملخص الدراسة

هذه دراسة مقطعية, وصفية وتحليلية تهدف لتحديد تردد حاملى مرض فقر الدم المنجلي بين أقارب مرضى فقر الدم المنجلي في ولاية القضايف فى الفترة ما بين أبريل إلى يوليه 2012. تضمنت الدراسة 17 أسرة تشمل 114 فرد من اصول عرقية مختلفة (56) من الذكور و(58) من الاناث الذين تتراوح اعمارهم ما بين سنة و70 سنة بالاضافة الى 30 فرد سليم كمجموعة مراقبة. 2.5 مل من الدم الوريدي اخذت من اى فرد فى مانع تجلط (ادتا) بحرص وسلامة كافية لضمان موثوقية النتائج. تم اجراء اختبار الدم الكامل وصورته؛ اختبار الترسيب؛ اختبار المنجل؛ واختبار الرحلان الكهربائى للهيموقلوبين. كان اختبار المنجل ايجابى فى (66.7%) وسلبى فى (33.3%) اما نتيجة الرحلان الكهربائى كانت كالاتى؛ حاملى مرض فقر الدم امنجلي (66.7%)؛ الاشخاص السليمين (24.6%)؛ المصابين بالانيميا المنجلية (5.3%) حاملى مرض هيموقلوبين سى (1.8%) والمرضى المصابين بمرض هيموقلوبين سى مع الانيميا المنجلية (1.8%). اعلى نسبة من حاملى مرض الانيميا المنجلية كانت فى قبيلة الهوسا (36.8%)؛ تليها الفلانى (26.3%)؛ البرقو الصليحباب (15.8%)؛ الحوازمة (11.4%) واخيرا الفور (9.6%). كما ان معظم افراد المجموعة المدروسة من ام واب من اصل عرقى واحد (98.24%) مما يعكس نسبة التزاوج العالية بين افراد المجموعة والتي تؤدى الى زيادة نسبة اكتساب الجين المسبب للمرض. اما متوسط مستوى الهيموقلوبين وعدد الخلايا الحمراء وحجم الخلايا المحشوة كان اقل فى مرضى الانيميا المنجلية (7.4g/dl)؛ ($2.7 \times 10^6 / \mu l$)؛ (22.6%) على الترتيب ومرضى الانيميا المنجلية مع هيموقلوبين سى (9 g/dl)؛ ($3.4 \times 10^6 / \mu$)؛ (27%) على التوالى مقارنة بحاملى مرض الانيميا المنجلية (12.5)؛ (4.6)؛ (38.2%) على الترتيب وحاملى مرض هيموقلوبين سى (13.5)؛ ($4.6 \times 10^6 / \mu$)؛ (38.2%) على التوالى؛ والذين لا تختلف نتائجهم عن نتائج الاشخاص السليمين (12.4g/dl)، ($4.4 \times 10^6 / \mu$)؛ (37.3%). كما ان قيمة متوسط حجم الخلية؛ متوسط تركيز الهيموقلوبين فى الخلية ومتوسط تركيز الهيموقلوبين توضح عدم وجود اختلاف فى نتائج كل من حاملى مرض الانيميا المنجلية وهى كالاتى (82.9fl)؛ (32.7g/dl)؛ (27.5 pg) على التوالى ومرضى الانيميا المنجلية وهى كالاتى (86.5fl)؛ (33.3g/dl)؛ (28.2pg) وكذلك مرضى الانيميا المنجلية مع هيموقلوبين سى وهى (79 fl)؛ (33g/dl)؛ (26.5 pg) على التوالى وايضا الاشخاص الاصحاء وهى (83.6fl)؛ (32.3g/dl)؛ (28.1pg) على التوالى. اما تعداد الخلايا البيضاء يوضح ارتفاعا فى مرضى

الانيميا المنجلية ($12.1 \times 10^3/\mu\text{l}$)؛ ومرضى الانيميا المنجلية مع هيموقلوبين سى ($8.5 \times 10^3/\mu\text{l}$)؛ مقارنة بكل من حاملى مرضى الانيميا المنجلية ($5.1 \times 10^3/\mu\text{l}$)؛ حاملى مرض هيموقلوبين سى ($10^3/\mu\text{l}$) ($3.6 \times 10^3/\mu\text{l}$)؛ والاشخاص الاصحاء ($4.5 \times 10^3/\mu\text{l}$)؛ والذين لا توجد اختلافات فى النتائج بينهم. اما متوسط الصفائح الدموية اعلى فى مرضى الانيميا المنجلية ($376 \times 10^3/\mu\text{l}$) (اقل فى مرضى هيموقلوبين سى مع الانيميا المنجلية ($160 \times 10^3/\mu\text{l}$) ولا يوجد اختلاف بين حاملى مرض الانيميا المنجلية ($10^3/\mu\text{l} \times 230$) وحاملى مرض هيموقلوبين سى ($10^3/\mu\text{l} \times 235$) والاشخاص الاصحاء ($10^3/\mu\text{l} \times 237$). متوسط معدل ترسيب الخلايا الحمراء مرتفع فى مرضى الانيميا المنجلية (42 mm/h)؛ ومرضى الانيميا المنجلية مع هيموقلوبين سى (95 mm/h) مقارنة بحاملى مرض الانيميا المنجلية (21 mm/h) وحاملى مرض هيموقلوبين سى (8 mm/h) والاشخاص الاصحاء (11 mm/h). وتوضح هذه النتائج فى الختام ارتفاع تردد حاملى مرضى الانيميا المنجلية فى المجموعة المدروسة ومقدرتهم على زيادة انتشار المرض نتيجة لزيادة نسبة زواج الاقارب فى المنطقة بالاضافة الى ضعف مستوى التوعية الطبية والجهل كما تعطى فكرة ايضا عن انتشار مرض الانيميا المنجلية بين القبائل الافرو- اسوية.

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List of abbreviations

CBC	Complete blood count
Hb	Haemoglobin
MCV	Mean cell volume
MCH	Mean cell haemoglobin
MCHC	Mean cell haemoglobin concentration
Hb S	Haemoglobin S
Hb SC	Haemoglobin S&C
Hb A	Haemoglobin A
CO ₂	Carbon dioxide
Hb E	Haemoglobin E
Hb F	Haemoglobin F
PCV	Packed cell volume
RBC	Red blood cell
TWBCs	Total white blood cells
SCD	Sickle cell disease
LDH	Lactate dehydrogenase
SCT	Sickle cell trait
HPFH	Hereditary persistent fetal haemoglobin
WBC	White blood cell
Plt.	platelet

ESR	Erythrocyte sedimentation rate
SPSS	Statistical package for social sciences

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