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Title

A Case-Control Study on the Impact of Body Mass Index and Lipid Profiles in Saudi Sickle Cell Disease Patients

Authors

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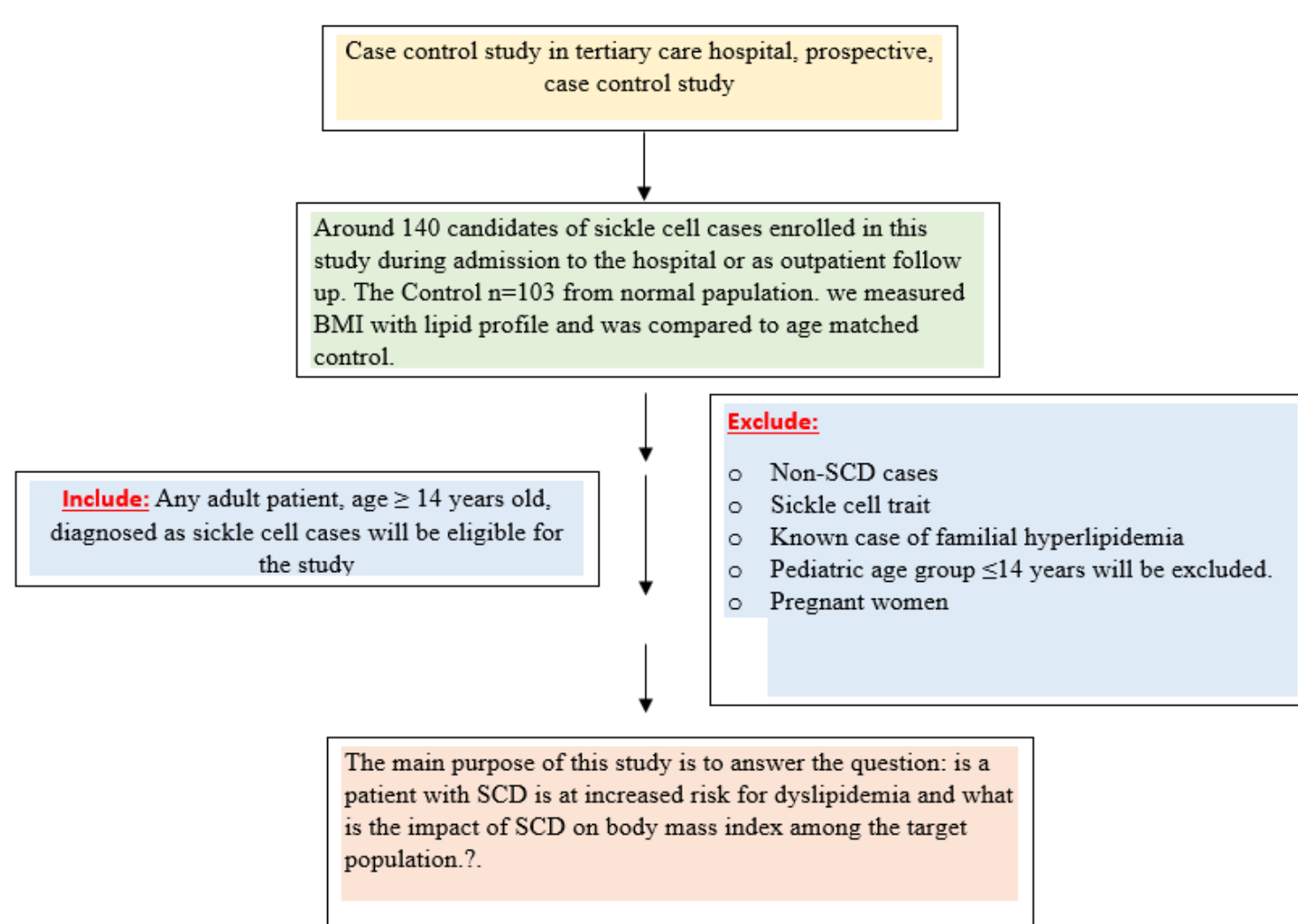
Introduction

Discovered in 1910, sickle cell disease (SCD) is an inherited multisystem monogenetic disease resulting from the substitution of one amino acid from valine to glutamic acid in the beta chain due to a nucleotide defect that causes the formation of abnormal beta chains in hemoglobin . Sickle cell disease is one of the ten most common causes of hospitalization in the Eastern Province of Saudi Arabia. This health condition can affect lipid levels, body weight, and metabolic parameters. This case control study aims to determine whether SCD patients are at increased risk of dyslipidemia, as well as study the effect of SCD on BMI of the population in the Eastern Province -Saudia Arabia. The importance of assessing blood pressure, fasting blood sugar, lipid profile, and body mass index (BMI) in patients with SCD and the impact of SCD on these factors is not widely reported and insufficiently studied. Therefore, these factors are the subject of ongoing research and conflicting arguments.

Methodolgy

This was an observational prospective case-control study among n = 140 SCD cases and n = 103 controls between April 2022 and April 2023. Comparisons between the SCD group and the control group were made based on assessment of body mass index (BMI), fasting lipid profiles (total cholesterol (TC), low-density lipoprotein (LDL), high-density lipoprotein (HDL) and triglyceride (TG)) and fasting blood sugar levels. The BMI was assessed based on the World Health Organization (WHO) classification: normal (18.5 - 24.9), overweight (25.0 - 29.9), obese class I (30.0 - 34.9), obese class II (35.0 - 39.9), and obese class III (> 40.0) .

Figure 1: STUDY DIAGRAM

Case control study in tertiary care hospital, prospective, case control study

Around 140 candidates of sickle cell cases enrolled in this study during admission to the hospital or as outpatient follow up. The Control n=103 from normal population. we measured BMI with lipid profile and was compared to age matched control.

Include: Any adult patient, age ≥ 14 years old, diagnosed as sickle cell cases will be eligible for the study

Exclude:
- Non-SCD cases
- Sickle cell trait
- Known case of familial hyperlipidemia
- Pediatric age group ≤14 years will be excluded.
- Pregnant women

The main purpose of this study is to answer the question: is a patient with SCD at increased risk for dyslipidemia and what is the impact of SCD on body mass index among the target population.?.

Results

The results showed that with the majority of participants being females, about 94.2% of SCD patients had the SS genotype. Hypertension was the most common comorbidity in SCD (5%). The majority of SCD patients were of normal body weight, followed by underweight. In terms of dyslipidemia risk, the SCD group had significantly lower mean BMI, cholesterol, LDH, and HDL than control group ($p < 0.000$). No significance between two groups in triglyceride level was found ($p < 0.14$). Fisher's exact test among the SCD group of the current research showed that more patients using hydroxyurea were less likely to be in the high LDL group than those not using hydroxyurea ($p = 0.005$).

Table 1 : Comparison of variables according to BMI in SCD patients (n = 140).

Variables		BMI Categories n (%)				Total	p-value
		Obese	Overweight	Underweight	Normal		
		8 (5.7)	28 (20)	34 (24.3)	70 (50)		
Genotype	SB	1 (12.5)	2 (25)	2 (25)	3 (37.5)	8	p = 0.55
	SS	7 (5.3)	26 (19.7)	32 (24.2)	67 (50.8)	132	
Hydroxyurea	Yes	6 (6.6)	18 (19.8)	20 (22)	47 (51.6)	91	p = 0.79
	No	2 (4.1)	10 (20.4)	14 (28.6)	23 (46.9)	49	
HIGH FBS	Yes	5 (14.7)	6 (17.6)	8 (23.5)	15 (44.1)	34	p = 0.111
	No	3 (2.8)	22 (20.8)	26 (24.5)	55 (51.9)	106	
High Cholesterol	Yes	0	2 (33.3)	0	4 (66.7)	6	p = 0.5
	No	8 (6)	26 (19.4)	34 (25.4)	66 (49.3)	134	
High LDL	Yes	0	1 (20)	0	4 (80)	5	p = 0.56
	No	8 (5.9)	27 (20)	34 (25.2)	66 (48.9)	135	
Low HDL	Yes	6 (4.7)	28 (21.9)	31 (24.2)	63 (49.2)	128	p = 0.12
	No	2 (16.7)	0	3 (25)	7 (58.3)	12	
High TG	Yes	1 (5)	8 (40)	2 (10)	9 (45)	20	p = 0.08
	No	7 (5.8)	20 (16.7)	32 (26.7)	61 (50.8)	120	

Conclusion

A summary of the results of this unique contribution to SCD data in the Saudi population showed that neither of the BMI categories was significantly associated with SCD. BMI was not associated with hospitalization rates as an indicator of disease severity, nor the hydroxyurea use. In this study showed the absence of an increase in TG levels among SCD patients compared with controls, although low HDL levels in SCD patients put them at risk of future hyperlipidemia, which requires frequent assessment.

Recommendation

* Low HDL levels in SCD patients put them at risk of future hyperlipidemia, which requires frequent assessment. Future studies are recommended to explore additional lifestyle patterns, which may provide better knowledge and allow comparison.

Acknowledgements