Medical Science

Quality of life of type-1 Diabetic adolescents attending Arar diabetic centre, Saudi Arabia

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DISCOVERY

SCIENTIFIC SOCIETY

ABSTRACT

Background: Diabetes influences the quality of life which includes social, psychological and physical characteristics that affect health condition. Extra efforts are essential to assess and give consideration to health related quality of life. *Aim of the Study*: To assess the Quality of life of diabetic adolescents and to correlate between Quality of life and Subjective burden among diabetic adolescents. *Methodology*: Case control study conducted at MOH Arar diabetic centre included 25 adolescents with type 1 DM (12-18 year) were selected randomly from those attending diabetic centre in Arar city using a pre-designed validated SF-36 questionnaire translated into Arabic to collect the data from the participants by personal interviews. Collected data was coded and analysed using statistical package for the social sciences (SPSS, version 20). Results: 55% of participants aged between 12-15 years old. 60% of participants were females. Of the 50 studied diabetic cases, 70% (35 case) reported regular insulin intake, 16% reported HbA1c ≤ 7.5% while 84% >7.5% (Mean ±SD= 9.11±1.40).Sex was significantly associated with the PHC, and MHC in the T1DM group (P < 0.05), and with the PHC in the control group (P < 0.05). Higher SF-36 scores were associated with poorer glycaemic control (HbA1c >7.5%) in physical functioning, (48.45±18.82), role limitations due to physical health (40.48±44.84) and general health (41.55±14.84). *Conclusion*: SF-36 scores of patients were low compared to control group which refer to poor quality of life among diabetic patients. Also, higher SF-36 scores were associated with poorer glycaemic control (HbA1c >7.5%) in all SF-36 components.

Keywords: Diabetes, T1DM, QoL, SF-36, KSA, Adolescents

1. INTRODUCTION

Diabetes mellitus (DM) is a very common disease worldwide affecting 382 million, and is expected to rise to 582 million by 2035 (Guariguata et al., 2013). Type 1DM is widely increased affecting 1 in 400-600 children and adolescents (Abdul-Rasoul et al., 2013). "Saudi Arabia is listed as third among the top 10 countries with the highest prevalence rates of diabetes" (Al-hayek et al., 2014). It is an autoimmune disease that caused by destroying of B cells of pancreas (Ghandoora et al., 2014). Diabetes affects quality of life as mentioned by a lot

of studies worldwide. Adolescents with type 1 DM have a lot of challenges include treatment technique (insulin injection or pump), restriction of diet and daily exercise (AlBuhairan et al., 2016). The treatment of type 1 diabetes is a self-management (Alvarado-Martel et al., 2015). Adolescents with type 1 DM have changes in quality of life due to management strategy and complications of diabetes (Alvarado-Martel et al., 2015; Bouya et al., 2020; Sabr et al., 2020). They have behavioural changes and need psychological and family support (Ghandoora et al., 2014).

Quality of life include social, psychological and physical aspects that affect health condition (AlBuhairan et al., 2016). The goal of treatment of type 1 DM aims to control blood glucose and prevent complications (AlBuhairan et al., 2016). More efforts are required to assess and give attention to health related quality of life. Patients with type 1 DM have impaired growth and are more likely to infections with long time diabetes (American Diabetes Association, 2014). There is a Danish study on Health Related Quality of Life (HRQoL) in children and adolescents on continuous subcutaneous insulin injection (CSII) and multiple daily insulin injections (MDI) , showed better quality of life in children and adolescents on long time CSII (Birkebaek et al., 2014; Al Baradi et al. 2020).

A study performed in Turkish children and adolescents with type 1 DM, demonstrated no correlation between metabolic control and HRQoL in children's self-reports and improving HRQoL levels in parents' proxy-reports were associated with good metabolic control (Caferoğlu et al., 2016). Family concerns and life style of their diabetic children are very effective in glycemic control (Özyazıcıoğlu et al., 2017). Costa and Vieira (2015) in a Brazilian study concluded that public assistance, time since diagnosis, sedentary lifestyle, and female gender led to the deterioration of quality of life.

In Saudi Arabia, Al-hayek et al., (2014), in Riyadh, Saudi Arabia, concluded that female, age, type of treatment, >7 HbA1c, and DKA are the strongest value for lower HRQoL for at least one subscale of the PedsQL 3.0 DM. Al Buhairan et al. (2016) in their study at three National Guard Hospitals, concluded importance of an interdisciplinary, biopsycho-social and family centered care approach to adolescents with a chronic disease.

Objectives

To assess the Quality of life of diabetic adolescents and to correlate between Quality of life and Subjective burden among diabetic adolescents

Research question

Is the QOL of diabetic adolescents differing from that of healthy peers?
What are the factors affecting the QOL of adolescents with diabetes?

Participants and Methods

Study design and setting: Case control study conducted at MOH Arar diabetic center, during the period from 1 July to 31 December, 2019.

Sample size: It is calculated by EPI info stat calac version 7.2.2.2. Considering the following factors:

Confidence level 95%

-study power 80%

-Ratio of case to control 1:1

Mean of case psychological domain 24.08 + 1.7

Mean of Control; 60 ± 3.1

(OR =2) group difference (5).

The sample was for 25 patients, 25 healthy controls

Study participants

25 adolescents with type 1 DM (12-18 year) were selected randomly from those attending diabetic center in Arar city. Total number of patients attending diabetic center in this age group around 2 to 3 patients daily, two visits per week were made and all of attending patients during 6 weeks were included. The control group of 25 healthy adolescents was randomly selected from PHC center.

Data collection

A pre-designed validated SF-36 questionnaire translated into Arabic by Guariguata et al. (2013) was used to collect the data from the participant's by personal interviews. The questionnaire cover the following items; Age, sex, educational level, duration of

disease, treatment type, previous hospitalization, complications of diabetes, physical activity and assess all domains of quality of life.

Exclusion criteria

Any adolescent who had a history of any chronic disease rather than type I diabetes was excluded from both the study groups. Adolescents who were diagnosed with type I diabetes since less than 1 year.

Statistical analysis

Collected data was coded and analysed using statistical package for the social sciences (SPSS, version 20). The significant difference was considered at P< 0.05.

Administrative and Ethical approval

The study protocol was submitted to local committee of general directorate health affairs of Northern Boarders for ethical approval. Also permission was taken from director of MOH Arar diabetic center. Before interview of participants, their parents was informed that participation is completely voluntary and asked to give an informed consent. Participants were informed that their data was dealt with confidentiality.

3. RESULTS

Table 1 shows, 55% of participants aged between 12-15 years old and 45% between 16- 18 (Mean ±SD=15.17±2.08). 60% of participants were females, 90% were Saudi and 60% had insufficient family monthly income. Of the 50 studied diabetic cases, 30% (15 cases) had diabetes for 0- 6 years and 70% (35 cases) had it for 7 years or more. 70% (35 case) reported regular insulin intake, 16% reported HbA1c ≤ 7.5% while 84% >7.5% (Mean ±SD=9.11±1.40).

Table 1 Socio-demographic characters of participants (n=100)

Parameter		No.	Percent %
Age group	12-15 years	55	55.0%
	16-18 years	45	45.0%
Age (Mean±SD)		15.17±2.08	
Sex	Male	40	40.0%
	Female	60	60.0%
Nationality	Saudi	90	90.0%
	Non-Saudi	10	10.0%
Family monthly income	Suffices	27	27.0%
	Insufficient	60	60.0%
	High income	13	13.0%
T1DM	Positive	50	50.0%
	Control	50	50.0%
Duration since diagnosis (n=50)	0-6 years	15	30.0%
	7 years or more	35	70.0%
Regular insulin intake (n=50)	No	15	30.0%
	Yes	35	70.0%
HbA1c (n=50)	≤ 7.5%	8	16.0%
	>7.5%	42	84.0%
HbA1c (Mean±SD)		9.11±1.40	

Table 2 and figure (1- 3) show SF-36 scores among T1DM vs. Control group, SF-36 scores of diabetic patients were low compared to control group which refer to poor quality of life among diabetic patients and this was significant (P<0.05). Table 3 shows mean scores for the physical health components (PHC), and mental health components (MHC) in associated with age, sex, nationality, and family monthly income. Sex was significantly associated with the PHC, and MHC in the T1DM group (P < 0.05), and with the PHC in the control group (P < 0.05). Table 4 shows that higher SF-36 scores were associated with poorer glycemic

control (HbA1c >7.5%) in all SF-36 components including physical functioning, (48.45±18.82), role limitations due to physical health (40.48±44.84), role limitations due to emotional problems (51.59± 46.10), social functioning (73.81±15.57), emotional well-being (48.10±17.52) and general health (41.55±14.84). None of these associations was statistically significant (P > 0.05).
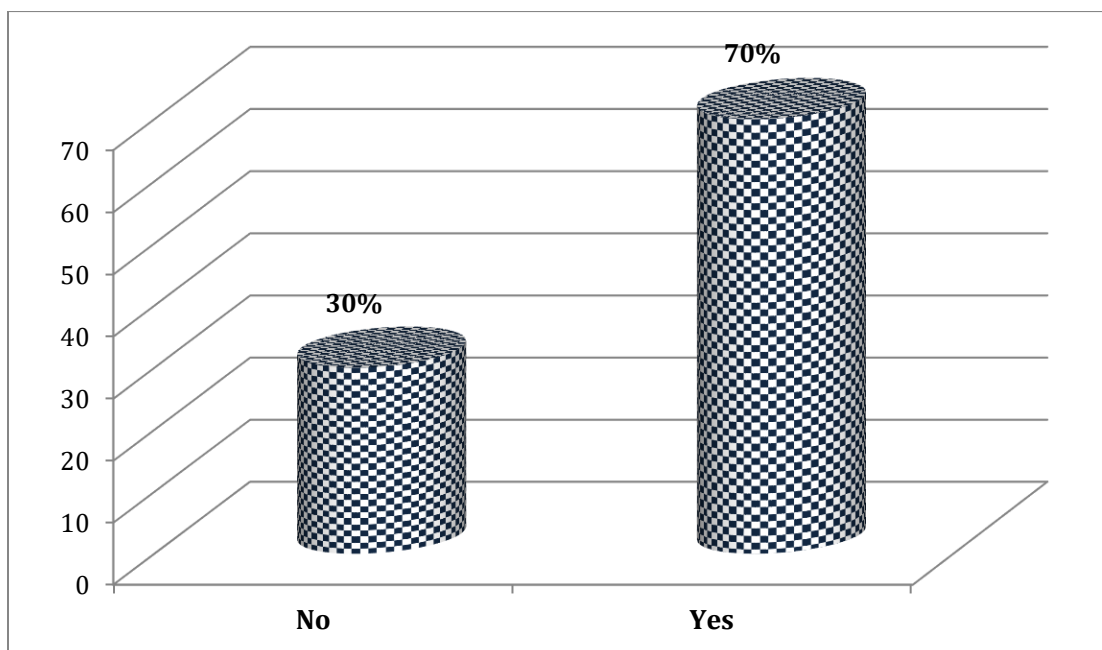

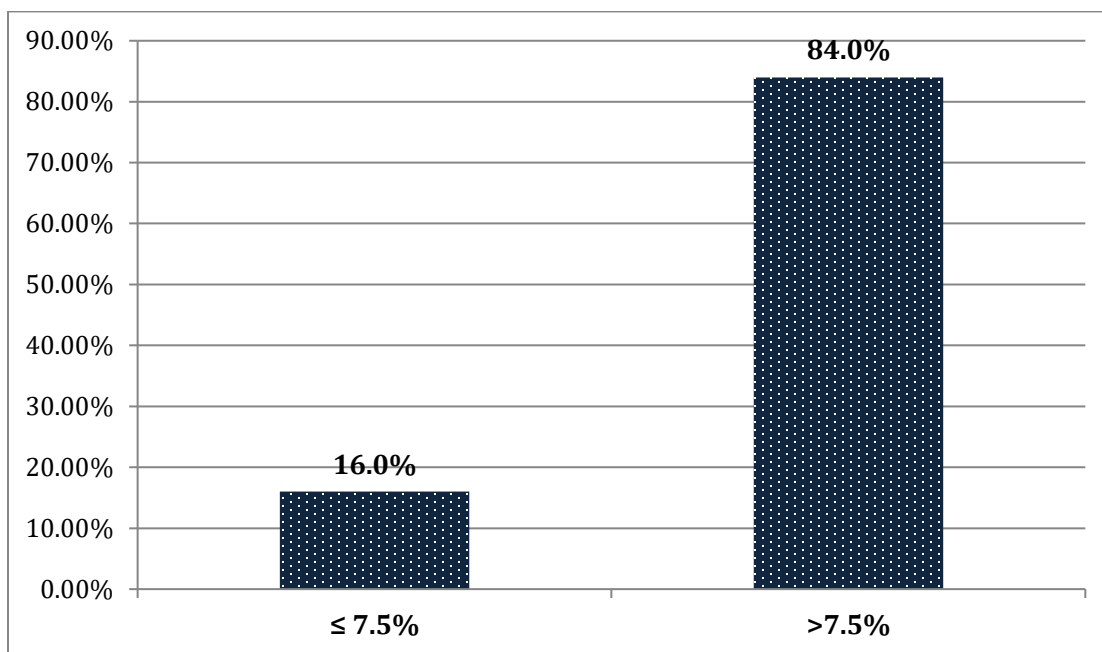**Figure 1** Regular insulin intake among the diabetic adolescents (N=50)

Figure 2 HbA1c among Type I diabetic adolescents (n=50)

Table 2 SF-36 scores among T1DM vs. Control group (n=100).

SF-36 Components	Group		*P-value*
	T1DM (Mean ± SD)	Control group (Mean ± SD)	
Physical functioning	48.3 ± 18.5	89.2 ± 12	*0.000*
Role limitations due to physical health	36.5 ± 44.1	99 ± 5	*0.000*
Role limitations due to emotional problems	46.7 ± 46.2	100 ± 0	*0.000*

Energy/fatigue	53 ± 18.7	82.2 ± 12.7	0.000
Emotional well-being	47.4 ± 16.3	83.2 ± 9.6	0.000
Social functioning	73 ± 15.8	98 ± 9.9	0.000
Pain	77 ± 20.3	98.8 ± 4.4	0.000
General health	40.5 ± 14.5	73.6 ± 10.4	0.000
Physical Health Component	50.6 ± 20.5	90.2 ± 4.3	0.000
Mental Health Component	55 ± 20.2	90.9 ± 6.5	0.000

*Independent sample t-test was used.

Figure (3): Simple error bar of SF-36 domain scores among T1DM patients a...

Legend: Physical functioning; Role limitations due to physical health; Role limitations due to emotional problems; Energy/fatigue; Emotional well-being; Social functioning; Pain; General health; Physical Health Component; Mental Health Component

T1DM vs. Control

Error Bars: 95% CI
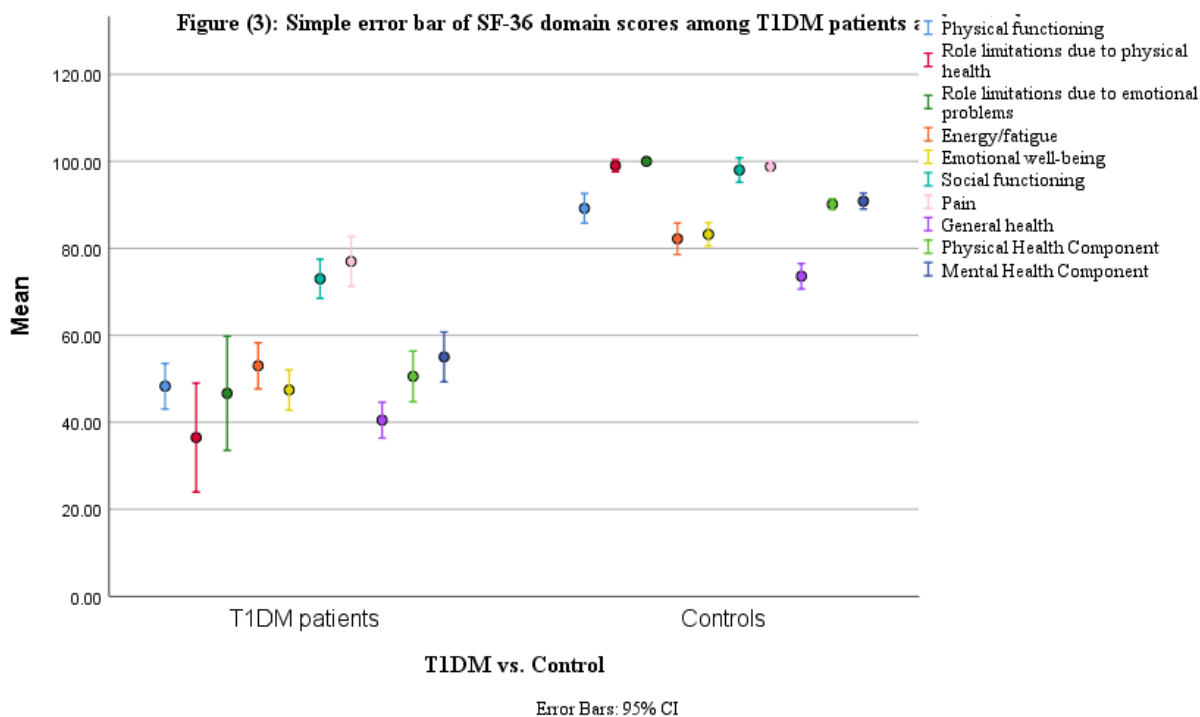
Table 3 Factors affecting physical and mental health components among T1DM vs. control participants (n=100).

Parameter		Group			
		T1DM		Control	
		PHC (Mean ± SD)	MHC (Mean ± SD)	PHC (Mean ± SD)	MHC (Mean ± SD)
Age group	12-15 years	53.6 ± 18.9	60.6 ± 18.6	90.5 ± 4.5	91.4 ± 6.9
	16-18 years	48.2 ± 21.7	50.6 ± 20.7	89.5 ± 4	89.8 ± 5.5
	P-value*	0.347	0.078	0.422	0.391
Sex	Male	59.8 ± 18.4	62.2 ± 18.6	92.1 ± 4.9	91.9 ± 7.4
	Female	42 ± 18.8	48.4 ± 19.6	89.2 ± 3.7	90.4 ± 6
	P-value*	0.001	0.014	0.049	0.470
Nationality	Saudi	50.5 ± 20.7	54.8 ± 20.3	90 ± 4.2	90.4 ± 5.9
	Non-Saudi	56.3 ± 0	67.4 ± 0	91 ± 5.2	93.1 ± 8.6
	P-value*	0.783	0.541	0.598	0.393
Family monthly income	Suffices	42 ± 19.2	48.1 ± 20.2	90.6 ± 5	90.5 ± 7.4
	Insufficient	53 ± 20.6	55.1 ± 19.3	90 ± 4.5	90.1 ± 6.3
	High income	58.4 ± 20	70.8 ± 18.7	90 ± 2	94.8 ± 4.4
	P-value**	0.154	0.069	0.921	0.218

*Independent sample t-test was used.

**One-way ANOVA test was used.

Table 4 SF-36 scores among controlled (≤ 7.5%) vs. uncontrolled (>7.5%) diabetes (n=50).

SF-36 Components	HbA1c (n=50)		P-value
	≤ 7.5%	>7.5%	
	Mean ± SD	Mean ± SD	
Physical functioning	47.5 ± 17.7	48.5 ± 18.8	0.895
Role limitations due to physical health	15.6 ± 35.2	40.5 ± 44.8	0.107
Role limitations due to emotional problems	20.8 ± 39.6	51.6 ± 46.1	0.076
Energy/fatigue	48.8 ± 7.9	53.8 ± 20	0.235
Emotional well-being	44 ± 7.1	48.1 ± 17.5	0.277
Social functioning	68.8 ± 17.7	73.8 ± 15.6	0.469
Pain	72.5 ± 25.2	77.9 ± 19.4	0.583
General health	35 ± 11.7	41.6 ± 14.8	0.190
Physical Health Component	42.7 ± 15.7	52.1 ± 21.1	0.168
Mental Health Component	45.6 ± 15.6	56.8 ± 20.6	0.102

*Independent sample t-test was used.

4. DISCUSSION

Type 1 diabetes mellitus (T1DM) is one of the most common chronic diseases, affecting 1 in every 400–600 children and adolescents (Roze et al., 2005). It is defined as a metabolic disease characterized by chronic hyperglycaemia resulting from absolute insulin deficiency and requiring lifelong insulin replacement therapy (Craig et al., 2009). Type 1 diabetes mellitus (T1DM) usually develops during infancy and adolescence and results from the progressive destruction of pancreatic beta cells and reduced insulin production (American Diabetes Association, 2014). Diabetes remains a major public health problem in Saudi Arabia, which affecting 24% of the population. Also, the burden of type 1 diabetes (T1DM) among children and adolescents in the country has more than doubled in the past decade with typicaloccurrence rates reported at 27.2/100,000 population (Al-Mendalawi et al., 2010). Living with T1DM poses various everyday disease management challenges for both adolescents and families and involves issues such as: intensive therapeutic insulin regimes (daily injections or pump adjustments), dietary limitations, regular exercise, and constant monitoring of biochemical markers (Diabetes Control and Complications Trial Research Group, 1997). T1DM and its complications may affect adolescents' living conditions over the years and may also influence their quality of life (QOL) (Sawyer et al., 2004).

Quality of life can be measured with instruments such as questionnaires. Short Form -36 (SF -36), one of the standard evaluation tools that is used to measure quality of life, is short, practical, and possesses good psychometric properties (Ware et al., 1993). Its 36 items include measures of physical function, pain, daily activities, feelings, sleep, overall health, and relationships with relatives. Scoring is on a 0–100 scale, with higher scores indicating better health (Sarac et al., 2007). According to the quality of life among T1DM patients, the study found that SF-36 scores of patients were low compared to control group which refer to poor quality of life among diabetic patients and this was significant (P<0.05). In disagreement with our results, in Brazil another study was conducted among adolescents aged 10–19 years who had been diagnosed with type 1 diabetes mellitus reported; in general, the adolescents consistently reported having a good quality of life (Costa & Vieira, 2015). Similar to our results, in Kuwait, another study was carried out among 436 patients (2–18 years) with T1DM demonstrated that the health-related quality of life (HRQoL) of children and adolescents with T1DM was consistently poorer than controls (Abdul-Rasoul et al., 2013).

In Saudi Arabia, a systematic search of published literature that has addressed T1DM in pediatrics and adolescents was carried out via the internet found that overall, the quality of life for patients and their families were impacted negatively (Ghandoora et al., 2017). Another descriptive correlational study explored quality of life included 69 adolescents with type 1 diabetes versus 75 healthy adolescents reported that patients with diabetes expressed lower life satisfaction and health perception than controls (Faulkner, 2003). Also, in Egypt, another study found that Diabetic patients have lower quality of life than healthy ones in the physical, emotional, and social domains (Sabri et al., 2014). However, findings from another study showed that youth with type 1 diabetes report remarkably similar quality of life to a nondiabetic youth population (Laffel et al., 2003).

Factors affecting physical and mental health components among T1DM vs. control participantsin our study werephysical and mental health components in both groups not affecting by age group, nationality, family monthly income (P>0.05). However, they affecting by sex (P<0.05). Another study reported that male gender predicted better QoL also, the age of the patient was an

important predictor of QoL; as children got older, the scores improved. Also, in our study uncontrolled diabetes (HbA1c >7.5%) associated with high SF-36 scores than controlled group but, this was not significant (P>0.05). However, another study found that lower HbA1c is associated with better QoL.

5. CONCLUSION

SF-36 scores of patients were low compared to control group which refer to poor quality of life among diabetic patients. Also, higher SF-36 scores were associated with poorer glycemic control (HbA1c >7.5%) in all SF-36 components. There was a lack of studies with the same objective in Saudi Arabia. Future studies regarding quality of life of diabetic adolescents in Saudi Arabia is recommended.

Authors Contributions
Areej Nughaymish Melfi Alanazi, shared in setting the study design, research objectives, preparing study instrument, pilot administration, data collection, and reviewing the results. Prof. Sabry Mohamed Hammad, held study approvals and supervised study phases. Dr. Amel Elwan, shared in preparing study proposal, logistics plan, data collection plan, supervised data entry and conducted the statistical analysis, data display, discussion guidelines, and final write up. All authors read and approved the final manuscript.

Conflict of interest
The authors would like to declare that there are no conflicts of interests.

Informed consent
Written & Oral informed consent was obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

Ethical approval
The study was approved by research ethical local committees of General Health Affairs of Northern Border region with researcher No. (0551573320), committee No. (H-09-A-51) and letter No. (42/6/171).

Data and materials availability
All data associated with this study are present in the paper.

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