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Paediatric Obesity: Investigating Parental Perception and Associated Risk Factors in a Cross-Sectional Study, Saudi Arabia

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Abstract **Background:** Obesity in children in today's world is becoming a critical global health problem, with very serious long-term consequences. In Saudi Arabia growing urbanization, changing eating habits, sedentary lifestyle are some of the common contributing factors to the growing prevalence of childhood obesity. This study seeks to assess the prevalence of paediatric obesity, explore associated risk factors and examine parents perception regarding their child's weight status. **Methods:** A cross-sectional epidemiological survey was carried out in 5 regions of Saudi Arabia (Riyadh, Jeddah, Abha, Qassim and Al Jouf). This survey included 600 participants (aged 0 to 18 years) and their parents. Information about respondents was collected through structured questionnaires that examined sociodemographic characteristics, lifestyle behaviours, parental weight status and attitudes. Data analysis was carried out using SPSS with a chi-square test being performed to find significant associations. **Results:** The study discovered that before the age of 5 years 58.6% children will become obese. Parents misunderstanding was prevalent among 60.7% of parents, considering their obese child as normal weight. Childhood obesity is significantly associated ($p<0.001$) with lifestyle factors such as, screen time exceeding 3 hours (38.3% overweight); eating fast foods, (62.5% overweight); and low physical activity of less than 15 minutes of daily exercise, (55.6% overweight). Furthermore, parents weight status and smoking status in the household conferred on a child a risk for being overweight, meaning smoking households had an overweight prevalence rate of 37.7% ($p = 0.004$). **Conclusion:** This work highlights the interaction of lifestyle, socio-economic and parental variables dictating the fate of paediatric obesity. Findings from this study underlines the need of the rigorous assessment of modalities of public intervention, from parental education to community initiatives and policy-driven health work. Future longitudinal studies should devote their lenses towards causation and the impact of obesity prevention input grounded in socio-economic variants.

Key Words Childhood obesity, parental perception, socio-economic factors, lifestyle behaviors, Saudi Arabia

INTRODUCTION

Childhood obesity is a mojor global public health problem, with serious consequences for physical, psychological and social well-being [1]. This is an interplay of many factors, like behavioural, environmental and genetic variables. Identifying these factors helps a great deal in realizing an effective risk management and preventive model [2].

The rapid increase in prevalence has raised such great concern; particularly thus in the regions experiencing rapid changes both socially and economically, actively including the Gulf region [3]. Physical inactivity, urbanization, changes in lifestyle and the ingestion of energy-dense food are factors that have created a rampant trend of excessive childhood obesity in Saudi Arabia in the last decades [4].

Childhood obesity is characterized by quite distinct problematic features, because it often tracks on to adulthood and it carries with it some of the associated deleterious repercussion, such as type 2 diabetes, cardiovascular diseases and certain cancers [5]. Various systematic reviews and meta-analyses suggest that the onset of excessive weight gain during childhood can permanently affect health, placing additional emphasis on instituting the prevention measures as early as possible [6-8]. Childhood obesity emanates not only through individual lifestyles but also through the interaction between social and environmental correlates. The level of parental education, socioeconomic level of families and urbanization seem to have a tremendous impact on the obesity prevalence. For example, disadvantaged children find it difficult to get affordable healthy food and recreation; living in the environment of obesity may also promote obesity-orogenic behavior [9-11].

Based on the WHO, the estimated prevalence of overweight is approximately 13.4% and that of obesity is about 18.2% in Saudi children. The situation shows a steep increase from 9.3% reported by the WHO in 2004 [12]. The report from the Saudi MOH describes the growing concern about rising obesity in children, especially in urban areas, which underscores the need for school health programs and campaigns to raise public awareness [13]. In 2023, GASTAT reported that about 7.3% of Saudi youth were classified as obese. Regional variation reflects differences in healthcare access and lifestyle characteristics [14].

Globally, the latest report of the World Obesity Federation gives an alarming caution: by 2035, it will be grossly overweight or become obese by more than half of the world population within its adolescence, expected to increase to exorbitantly high rates of obesity in adolescents. The economic burden of obesity is likely to exceed $4 trillion annually, which almost equals to up to 3% of the GDP world over, emphasizing the required urgency behind such effective strategies in implications [15-16].

The parent's knowledge and perception of their child's weight status are critical to obesity management because early recognition leads to intervention. Knowledge of the association between parental awareness and the obesity risk factors can inform the establishment of effective outcomes for educational and preventative efforts that work to decrease the expanding problem of childhood obesity. This study will assess the prevalence of paediatric obesity in the rest of the regions of Saudi Arabia, assess associated risk factors and use evidence to help guide public health interventions and policy development.

METHODS

This cross-sectional observational study was carried out in various geographical areas of Saudi Arabia to ensure a wide sample of populations, including Central, Western, Northern and Southern regions. These locations comprised Riyadh and Qassim (Central Region), Jeddah (Western Region), Aljouf (Northern Region) and Abha (Southern Region) so as to guarantee a broad geographic representation. The population sizes vary between these areas; economic activity and other environmental factors provide an extensive evaluation of obesity-related factors in different communities.

This study aimed to evaluate paediatric obesity risk factors and awareness of weight problems among the parents of obese children from various regions of Saudi Arabia. Surveys were administered over a period of four months using online and healthcare-based formats; the 600 paediatric cases were to be filled in by parents or guardians. A stratified random sampling method was followed to ensure diverse representation across five regions with varying income levels, access to healthcare and urbanization rates. Sample size was determined considering a confidence interval of 95% and margin of error of 5% using a cross-sectional research formula (n = Z P (100-P)/E) to ensure a representative sample size. The inclusion criteria were paediatric patients aged 0-18 years, consenting guardians; while paediatric patients with other health conditions affecting weight, recently transferred patients, those without consent were excluded. A pilot study with 30 subjects was conducted to pretest the questionnaire and the data were analysed using SPSS, employing statistical tests for finding associations. Ethical principles included obtaining informed consent, confidentiality and the adherence to research guidelines were followed.

RESULTS

The survey conducted at Saudi Arabia's five regions, with Jeddah and Riyadh having the largest numbers. Most participants were from middle-class families, were full-term, spontaneously delivered and breastfed. Most slept well and few had chronic illnesses. Dietary practices included fast food and home-cooked meals, with little physical exercise and screen time. A significant fraction had early-onset overweight status before age five (Figure 1).

Figure 2 shows that most parents are well-educated, with a significant percentage having a bachelor's degree. Most parents are working and a significant percentage are overweight. Some fathers and a lower proportion of mothers have hypertension. Smoking is also observed in some homes.

Key factors were significant as they directly shape obesity risk through early habits, parental influence and socioeconomic constraints affecting lifestyle choices.

Parental misperception delayed recognition of obesity, reducing early interventions and increasing the risk of long-term weight issues in children.

DISCUSSION

This study underscores the complex relationship among socio-demographic, lifestyle and parental factors affecting paediatric obesity in Saudi Arabia. The study

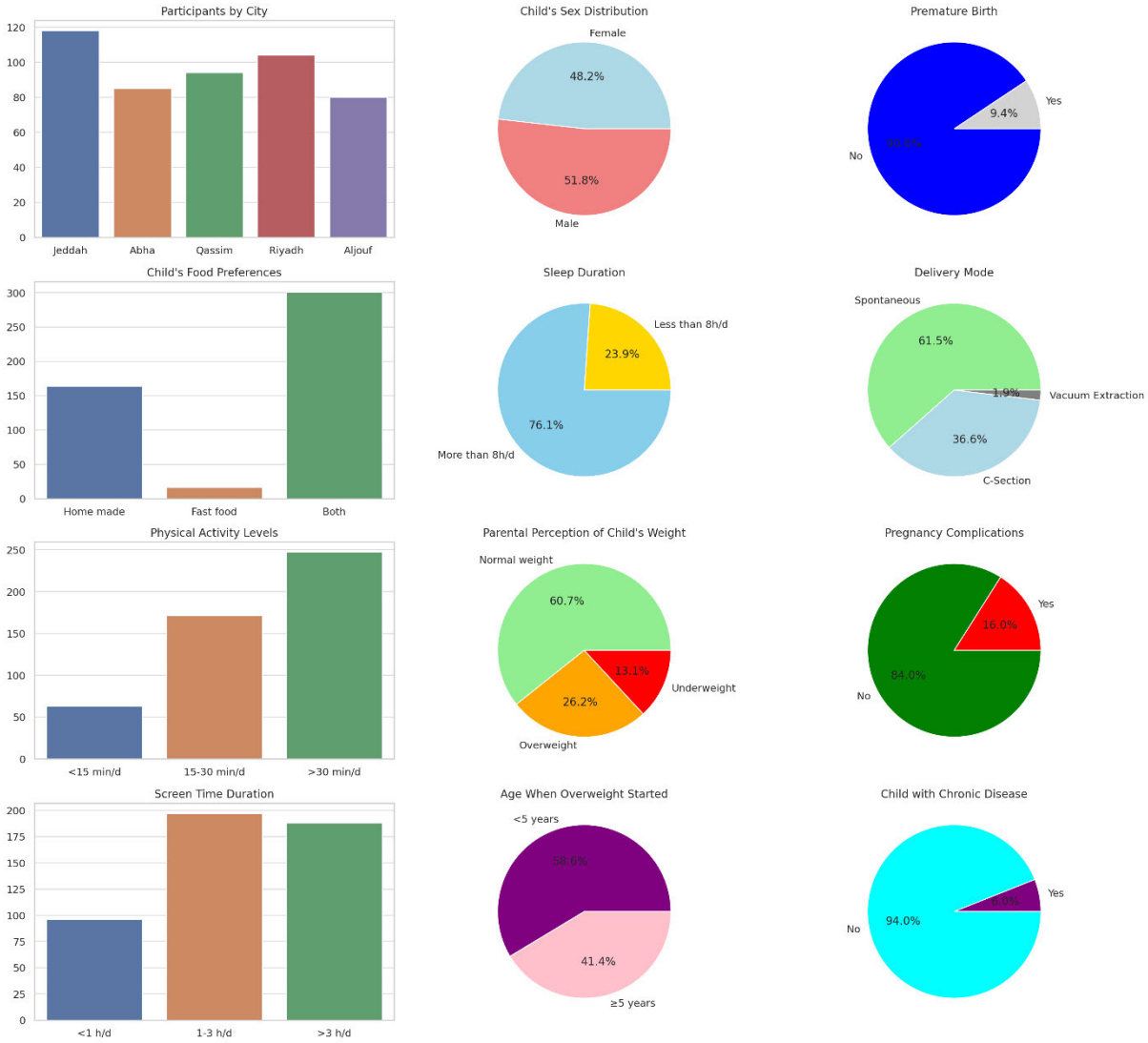

Figure 1: Socio-demographic and clinical characteristics of paediatric patients

highlighted the significant risk factors contributing to childhood obesity and therefore presented a need for interventions addressing these significant risk factors.

Figure 1 demonstrates that, this research had participants recruited from five cities in Saudi Arabia, with representation higher from the cities of Jeddah, at 24.5% and Riyadh, at 21.6%. Coastal cities such as Jeddah and Riyadh are two of the most urbanized cities in the Kingdom. They have been implicated in the increase in obesity rates, being amongst the pressing issue after urbanization was identified as one of the contributory factors. Our findings were in line with such a report from the Saudi Ministry of Health in 2023 that termed urbanization as directly linked to obesity due to changes in diet, physical activity and lifestyle regarding obesity [13]. Moreover, data from the General Authority for Statistics in 2023 showed variations with localities with higher urbanization levels showing a higher burden of obesity [14].

The equal gender balance (51.8% male and 48.2% female) serves to further broaden generalizability across gender. Further, the sociodemographic profile of the participants highlighted in the data indicates that at least 38.0% of the families belong to the middle-income group (10,000-20,000 SAR). Prior research by Al-Hussaini *et al.* [12] found that physical fitness and obesity were considerably worse in lower-income children than in higher-income children. Jin and Jones-Smith [17] noted that children from low-income families have worse physical fitness and are at higher risk for obesity than children from high-income families.

Present study showed that lifestyle factors such as nutrition, screen time, physical activity are known to be associated with early onset of obesity. Urbanization, according to the Saudi Ministry of Health [13], is associated with obesity through sedentary lifestyles, screen time and unhealthy eating patterns.

About 58.6% of children were found to be overweight by the age of five, representing early-onset obesity as a major concern. This echoes the results of the Ma *et al.* [18], which noted that obesity at early ages tends to increase the risk for later-onset weight

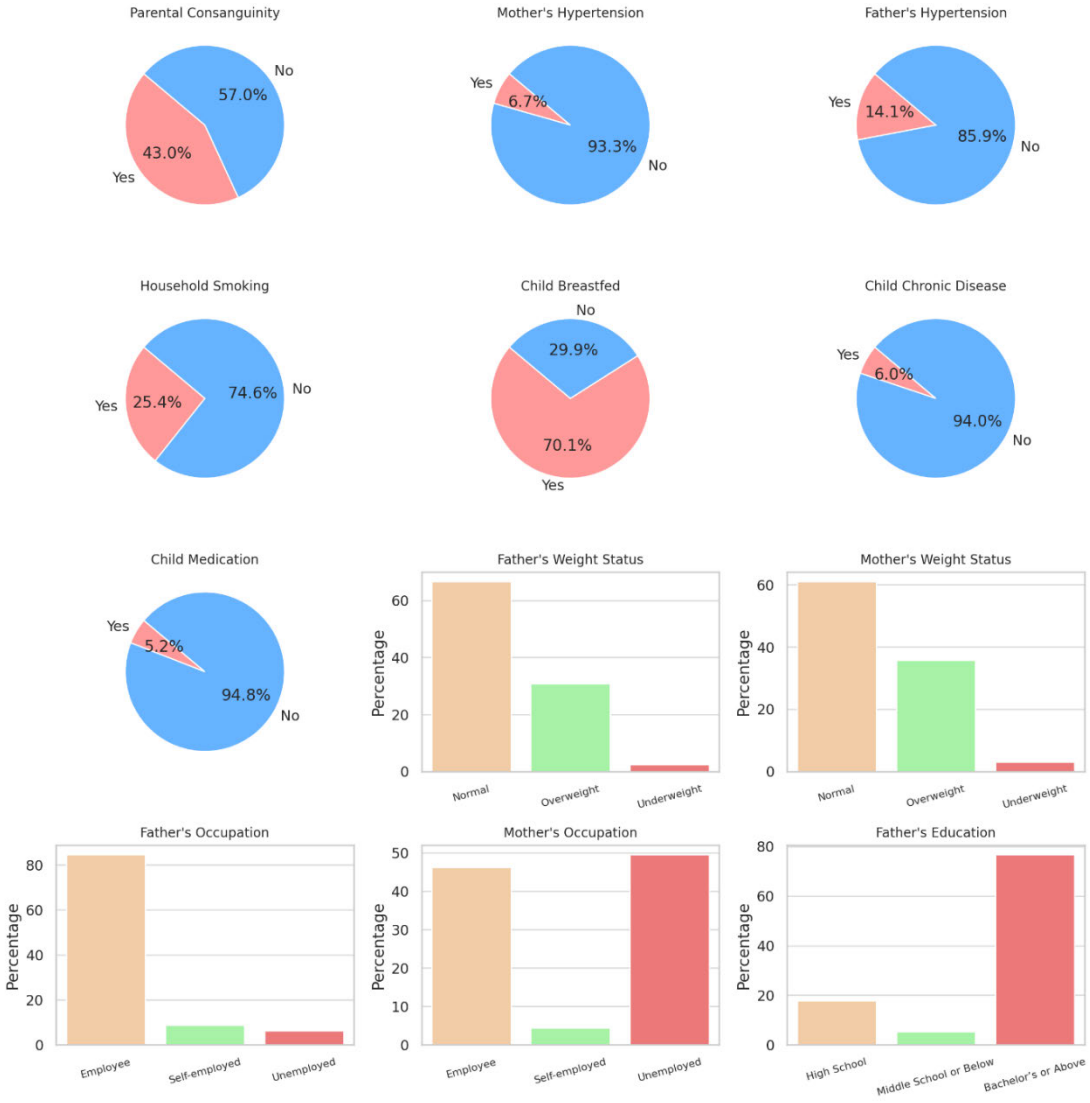

Figure 2: Parents Characteristics of paediatric patients

problems and metabolic disorders. The study also showed that 60.7% of parents viewed their child as normally weighted, although these children may fit into categories for overweight and obesity. This consonance with study results of Muhammad *et al.* [19], which noted parental under assumption of their child's weight to be a contributing factor to future delays in interventions. The general conclusion thus adds support to existing evidence, which states about risks associated with early-onset obesity and/or parental misperceptions pertaining to timely intervention.

The current study shows in Figure 2 the major factors influencing childhood obesity, which correlates with earlier studies. Parental health and consanguinity play a significant role; 43% of the cases occurred in a context of consanguineous marriages, corroborating the findings by study regarding genetic risks. Household smoking linked to childhood health issues was reported by study at 25.4%. A high rate of breastfeeding (70.1%) reinforced Ma *et al.* [18] findings about its protective role against obesity. Parental weight status and employment were the influencing factors; overweight parents were more likely to have overweight children, supporting Muhammad *et al.* [19] Greater paternal (76.7%) and maternal (80.2%) academic qualifications were found to correlate with healthier eating habits as noted by Almuhanna *et al.* [20]. This basically reconfirms the findings of previous research on the genetic, lifestyle and socioenvironmental factors responsible for childhood obesity in Saudi Arabia.

The results of this study, as shown in Table 1, reveal key associations between childhood obesity and socio-demographic and lifestyle factors, which corroborate earlier research.

Geographical Variation & Obesity

The study established considerable variation by regions in childhood weight status (χ^2 = 23.974, p = 0.002). Jeddah and Qassim had higher proportions of normal-weight children (70.3% and 67.0%, respectively), while

Table 1: Risk Factors associated with paediatric obesity

Factors		Child's weight status (%)			Chi-sqaure	p-value
		Normal weight	Over weight	Under weight		
Child's city	Jeddah	70.3	18.6	11.0	23.97	0.002
	Abha	49.4	42.4	8.2		
	Qassim	67.0	17.0	16.0		
	Riyadh	60.6	25.0	14.4		
	Aljouf	51.3	32.5	16.3		
Child's sex	Female	63.8	25.0	11.2	2.171	0.338
	Male	57.8	27.3	14.9		
Premature birth	Yes	62.2	13.3	24.4	8.034	0.018
	No	60.6	27.5	11.9		
Delivery mode	Spontaneous birth	59.1	28.0	12.8	1.422	0.840
	Caesarean section	63.1	23.3	13.6		
	Vacuum extraction	66.7	22.2	11.1		
Complications during pregnancy	Yes	57.1	29.9	13.0	.665	0.717
	No	61.4	25.5	13.1		
Was your child breastfed?	Yes	61.7	26.4	11.9	1.507	0.471
	No	58.3	25.7	16.0		
Child suffers from any chronic disease?	Yes	44.8	41.4	13.8	4.009	0.135
	No	61.7	25.2	13.1		
Child takes medication?	Yes	44.0	40.0	16.0	3.300	0.192
	No	61.6	25.4	12.9		
Duration of sleep	Less than 8h/day	53.0	32.2	14.8	3.852	0.146
	More than 8h/day	63.1	24.3	12.6		
Food eaten by your child?	Home made	79.3	8.5	12.2	50.43	<0.001
	Fast food	31.3	62.5	6.3		
	Both	52.2	33.9	14.0		
Screen time of child	Less than 1h/day	78.1	8.3	13.5	32.178	<0.001
	1-3 hours per day	63.5	23.4	13.2		
	More than 3 hours per day	48.9	38.3	12.8		
Your child's physical activity?	Less than 15 minutes/day	38.1	55.6	6.3		
	Between 15-30 minutes/day	57.9	31.0	11.1	45.719	<0.001
	More than 30 minutes/day	68.4	15.4	16.2		

Abha and Aljouf showed higher rates of overweight (42.4% and 32.5%, respectively). Similar socioeconomic disparities in obesity prevalence across Saudi Arabia were in fact established by Al-Hussaini *et al.* [12], attributing its regional higher rates to changing dietary habits and reduced physical activity.

Sex Differences in Weight Status

Males were found to be overweight more than females (27.3% versus 25.0%); however, this association was not statistically significant (p = 0.338). In similar respects, Muhammad *et al.* [19] provided findings that suggest that gender differences in obesity among Saudi children are minimal; yet lifestyle differences may account their contribution.

Premature Birth & Obesity

The incidence of premature birth was significantly associated with underweight status (24.4%, p = 0.018), supporting Barker's model of developmental origins which posits that low-birth-weight infants have altered metabolic programming that influences their future risk for becoming obese [21].

Breastfeeding & Obesity Protection

Although breastfed children had lower odds of overweight (26.4%) than non-breastfed children (25.7%), it was not a significant association (p = 0.471). Breastfeeding may be a protective factor for obesity and high body fat in 9- to 11-year-old children from 12 countries (Ma *et al.* [18]).

Lifestyle Factors-Diet, Screen Time & Physical Activity

Fast food consumers weighed more at a significantly higher rate (62.5%, p<0.001) than those consuming home food (8.5%). This concurs with findings from Almuhanna *et al.* [20], which associate Westernized diet with increased obesity prevalence among Saudi children. Screen Time: more freelance time (>3 hours/day) led to higher overweight rates at 38.3% (p<0.001). This supports the commonality in findings with Al-Ghamdi [22], who focused on excessive screen exposure as a contributing factor of sedentary behaviour and as a contributor to obesity. Physical Activity: having less than 15 minutes of activities during the day was highly linked to overweight (55.6%, p<0.001), reaffirming Al-Dossary *et al.* [23], who suggested that insufficient physical activity was a significant contribution to paediatric obesity in Saudi Arabia.

Table 2: Parental Risk Factors associated with paediatric obesity

Factors		Child's weight status (%)			Chi-square	p-value
		Normal weight	Overweight	Underweight		
Anyone in the household smoke?	Yes	51.6	37.7	10.7	11.224	0.004
	No	63.8	22.3	13.9		
Parents consanguineous	Yes	55.6	27.5	16.9	5.866	0.053
	No	64.6	25.2	10.2		
Type of food eaten by the father	Home made	58.2	28.8	13.0	3.099	0.541
	Fast food	46.2	38.5	15.4		
	Both	63.5	23.5	13.1		
Type of food eaten by the mother	Home made	62.2	24.4	13.4	4.466	0.347
	Fast food	33.3	55.6	11.1		
	Both	60.5	26.6	12.9		
Father's weight status	Normal weight	67.9	20.9	11.2	22.68	<0.001
	Overweight	45.9	37.8	16.2		
	Underweight	50.0	25.0	25.0		
Mother's weight status	Normal weight	63.9	24.5	11.6	6.610	0.158
	Overweight	55.2	30.2	14.5		
	Underweight	60.0	13.3	26.7		
Mother hypertensive	Yes	53.1	37.5	9.4	2.360	0.307
	No	61.2	25.4	13.4		
Father hypertensive	Yes	42.6	50.0	7.4	23.38	<0.001
	No	63.7	22.3	14.0		
Father's occupation	Employee	62.2	24.6	13.3	4.683	0.321
	Self-employed	48.8	39.5	11.6		
	Unemployed	58.1	29.0	12.9		
Mother's occupation	Employee	62.6	27.9	9.5	5.768	0.217
	Self-employed	52.4	33.3	14.3		
	Unemployed	59.7	23.9	16.4		
Father's education	High school degree	51.2	33.7	15.1	5.629	0.229
	Middle school or below	53.8	34.6	11.5		
	Bachelor's degree or above	63.4	23.8	12.7		
Mother's education	High school degree	50.6	30.1	19.3	12.217	0.016
	Middle school or below	33.3	58.3	8.3		
	Bachelor's degree or above	63.7	24.4	11.9		
Monthly household income (SAR)	<5000	62.7	29.4	7.8	4.178	0.653
	5000-10,000	61.3	22.6	16.1		
	10,000 -20,000	59.0	26.8	14.2		
	20,000 and above	61.8	28.2	10.0		

While previous studies spotlighted genetic factors, this current study looks at those diet, screen time and physical activities belonging to the modifiable risk factors. Here, the associations between breastfeeding and obesity were statistically insignificant, unlike Ma *et al.* [18], which revealed a larger protective effect. Unlike Muhammad *et al.* [19], who demonstrate a greater parental misperception of obesity, we do not analyse the perception of parental knowledge with respect to weight status distribution.

The results of the present study (Table 2) confirm and complement the earlier research on childhood obesity and its associated factors.

Household Smoking & Parental Consanguinity

In line with Al-Hussaini *et al.* [12], this study showed that more children in households with smoking parents were overweight (37.7%) compared to those in non-smoking households (22.3%) ($p = 0.004$). This finding supports the conclusion that exposure to second hand smoke raises the chances of developing obesity. Equally marginally associated with child weight status was parental consanguinity ($p = 0.053$), thus supporting Ma *et al.* [18], who suggested that genetic predisposition may play a role in susceptibility to obesity in consanguineous families.

Parental Diet & Weight Status

Children whose fathers consumed fast food tended to be overweight (38.5%) compared with those whose fathers did not and who consumed nutritious meals from home (28.8%); however, this association was not significant, $p = 0.541$. Overweight fathers (37.8%) and hypertensive fathers (50.0%) were significantly more likely to have overweight children ($p = 0.001$), supporting the conclusion of Al-Dossary *et al.* [23], who found a strong intergenerational link in obesity trends.

Parental Education & Socioeconomic Factors

Children with mothers who had low levels of education (from middle school or below) made up the highest percentage of the overweight epidemic (58.3%); however, those whose mothers were highly educated accounted for the lowest percentage (24.4%) ($p = 0.016$). This corroborated the findings of Muhammad *et al.* [19], who concluded that poor maternal education was linked to poor nutrition knowledge and bad child-feeding practices. However, household income was found not to be a significant correlate with child weight status ($p = 0.653$), against the assertions made by Barker [21] that lower-income households have a strong link with an increased risk of obesity.

These findings collectively affirm existing studies on parental control, heritable risk factor and different drug use parameters that may enhance childhood obesity but at the same time reveal huge cultural and regional variations.

Good execution of parental education initiatives should entail including nutrition and lifestyle awareness into school curriculum, providing seminars in healthcare environments and using social media marketing catered to local cultural settings. Policies restricting harmful food promotion to children, easily available recreational activities and corporate projects promoting parental engagement in child health should all be part of community-based solutions. To guarantee that these policies are both durable and effective, cooperation among legislators, schools and healthcare professionals is necessary.

Contributors to these phenomena affecting childhood obesity include parent's perception, socio-economic status, lifestyle behaviours and family health history. There may be apprehension about early-onset obesity: that is most likely contributed through parental misperception and riskier behaviours like supply of unhealthy foods and excessive screen time coupled with physical inactivity. These also include household smoking, parental body weight and socio-economic conditions. Some urgent issues at this time deserve broader approaches to their exploration inclusive of parental education, lifestyle modification and community intervention. Future research will definitely concentrate on such long-term ideas and realize a considered intervention program to mitigate the risk of obesity among various socio-economic groups.

While this study presents significant data, it has some limitations. Being a cross-sectional study, it establishes no directionality of causation and therefore warrants further investigation into the long-term impact of risk factors on childhood obesity using longitudinal studies. Although the participants were selected from various cities within Saudi Arabia, the study findings may not entirely represent children living in rural areas or from lower socioeconomic backgrounds. Future work ought to consider urban-rural disparities in childhood obesity and explore the effects of different socioeconomic factors on obesity's risk across different demographic groupings.

CONCLUSIONS

This study highlights important factors in the multifaceted socio-demographic, lifestyle and parental link to childhood obesity in Saudi Arabia. The results indicate that obesity when identified is an alarming finding; many children become overweight before five years of age. Additionally, parental misperception regarding their children's weight status remains a critical barrier to timely intervention on behalf of children. Because of this, there exists a real danger of increased health risks related to obesity. Unhealthy dietary habits, excessive screen time and lack of physical activities are some other strong correlates leading to higher rates of obesity.

Household smoking parental weight statuses and factors from the socio-economic realm constitute a big part in explaining children's weight outcomes. The study calls for timely public health strategies such as parental educating, healthier lifestyle promotions and community intervention for obesity. Addressing the identified risk factors in the context of each other within policy and awareness campaigns should help with obesity prevention more generally.

Paediatricians should frequently test for obesity using growth charts, teach parents on proper weight assessment and offer customised advice on diet and physical exercise in order to handle early-onset obesity and parental misperception. Mandatory obesity screenings in schools, culturally relevant parental education programs and urban design projects aiming at encouraging physical activity should all be part of public health interventions. Further enhancing early identification and intervention is strengthening healthcare practitioner training on obesity management and including digital health technologies for monitoring kid growth.

As the study is cross-sectional, further longitudinal studies are necessary to examine how the identified risk factors will translate into long-term implications on childhood obesity. These studies need to focus on differences prevailing between urban and rural populations and the difference in the tendencies of obesity attributable to socioeconomic differences. A well-rounded, multi-sectoral approach is a prerequisite to curb the rising prevalence of childhood obesity and ensuring health benefits for future generations.

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