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The clinical link of preschoolers' picky eating behavior with their Growth, Development, Nutritional Status, and Physical Activity in Iraq/Kurdistan region

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Background: This study aimed to evaluate the prevalence of picky eating among preschoolers and to estimate the clinical association between eating behavior and growth, physical activity, development, and health status.

Methods: In this study, a structured questionnaire was used to perform a cross-sectional descriptive study of 800 parents of preschoolers aged 2–4 years in Kurdistan/Iraq. Data collected included: demographics, food preferences, eating behavior, body weight, BMI, height, development, physical activity, and records of medical illness. Data from children defined as picky or non-picky eaters responses were analyzed and compared using standard statistical tests according to parental' questionnaire.

Results: The mean age of the children was 2.85 years; among 800 participants, 620 (77%) were picky eaters. Compared with non-picky eaters 180 (23%), z-score of weight-for-age, height-for-age, and body mass index (BMI)-for-age in picky eaters was 0.91, 0.73, and 0.44 SD lower, respectively. There were significant variations of rates in the weight-for-age, height-for-age, and BMI-for-age percentiles <15, between picky and non-picky eaters ($P = 0.04, 0.023, \text{ and } 0.005$, respectively). Certain findings were higher in picky as compared to non picky preschoolers including negative social communication such as afraid of unfamiliar places 65% vs 13.3%, afraid of being lonely 14.6% vs 12.1%, poor physical activity 36.8% vs 17.7%, learning disability 16.2% vs 7%, attention deficit 11.8% vs 4.3%, speech delay 4.6% vs 3.3%, respectively).

Conclusion: The prevalence of picky eaters in preschool children was high, resulting in significant detrimental impacts on growth, nutritional status, development, physical activity, and health status..

Background

Picky or selective eating often refers to those children with strong food preferences, consuming an insufficient variety of foods, restricting the intake of certain food groups, consuming a limited amount of food, or being reluctant to try new foods. Picky-eating behaviors are common in infancy and childhood (1); however, there is no specific medical definition for the term "picky or selective eater" (2–4).

The prevalence of selective eating among children varies in different countries. In one study in San Francisco, almost twenty to sixty percent of young children were reported by their parents not to be eating optimally (5). Another study of 120 children aged 2–11 years identified thirty nine percent as picky eaters (6), and picky eating prevalence as high as fifty percent was reported in children aged 19–24 months in a study carried out in North America (7). Picky eating behavior was reported by parents in half (54%) of the aged 3–7 years children in China (8). A recent study reported that thirty six percent of young Chinese preschoolers aged 2–3 years old had selective-eating behaviors (9).

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Moreover, contradictory outcomes of prevalence of childhood picky eaters were reported studies, probably due to variations in definitions, methods of assessment, and diverse age ranges of children studied (Goh, Jacob, 2012, Jacobi et al, 2008, Mascola et al, 2010, Micali et al, 2011). Preschoolers often use their body language or non-linguistic verbalizations to express their meal favors, while older children independently make their food preferences at school, therefore the parent understand the refusal of food as being stronger as the child grows. However, picky eating behaviour is quite frequent in school children with the prevalence ranging from thirteen percent–forty seven percent in developed countries (Goh. Jacob, 2012, Jacobi et al, 2008, Mascola et al, 2010).

Picky eaters usually have a limited dietary variety and consume few fruits, vegetables and meat rich in micronutrients (Shim et al., 2011). In addition, their intake of fats, fibre, protein and sweets is lower than that of non-picky eaters (Galloway et al., 2005). It is still unclear whether the impact of picky eating on height and weight depends on the types of food rejected by the picky eaters.

Picky eaters might have normal development besides to those with medical or developmental disorders (5), and selective eating in early childhood might extend and proceed to eating disorders in adolescence and early adulthood (10). Furthermore, behavioral feeding disorders may be associated with delayed development (8, 11, 12), and some children who are picky eaters might be underweight (3, 8, 12).

Globally, picky eating habits of preschool children are not well studied . Currently, there has been limited research on picky eating in preschoolers with limited informative data.

In addition, fussy eaters have certain distinguished characteristics reluctance to try new foods, a dislike of certain varieties of foods, and a very good opinions about food preparation (Galloway et al, 2005, Jacobi et al, 2008, Shim et al, 2011), which result in eating small quantities and a limited types of food, potentially impacting a child's growth (Goncalves et al, 2013, Li et al, 2001, Steyn et al, 2006). Consequently this can result in long-term eating disorders in adolescence and early adulthood. Hence, childhood picky eating have reported conflicting results, possibly due to inconsistencies in definitions and methods of assessment, as well as different age ranges of children studied. (Needham et al, 2007, Woolston, 1983). Prevalence, studies (Goh, Jacob, 2012, Jacobi et al, 2008, Mascola et al, 2010, Micali et al, 2011).

Some picky eating behavior in very young children, from parents' subjective perceptions, may be due to Neophobia, which is different from pickiness in older children. Neophobia is the fear of anything new, especially a persistent and abnormal fear. In its milder form, it can manifest as the unwillingness to try new things or break from routine. In the context of children the term is generally used to indicate a tendency to reject unknown or novel foods.

High nutrient requirement is needed for school-aged children as they undergo rapid growing ; therefore, their eating habits are essential for optimal development. However, picky eating behavior is relatively common during childhood while at school, with the prevalence ranging from thirteen percent to forty seven percent in developed countries (Goh, Jacob, 2012, Jacobi et al, 2008, Mascola et al, 2010).

Moreover, selective eating in early childhood has been shown to continue into mid-adolescence, which is associated with eating disorders, lasting fussy eating, and limited dietary variety in adolescence and adulthood (Kotler et al, 2001, McDermott et al, 2010, Nicklaus et al, 2005). However, the clinical impact of

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picky eating on the growth of children is still controversy. One longitudinal study of 1498 children aged 2.5, 3.5, and 4.5 years in Québec found that picky eaters were twice as likely to be underweight at 4.5 years old than children who were never picky eaters (Dubois, Farmer, Girard, Peterson, & Tatone-Tokuda, 2007), whereas, Contradictory findings from another longitudinal study with 120 children in the San Francisco Bay area followed from 2 to 11 years of age suggested no significant effects of picky eating behavior on growth (Mascola et al., 2010). These opposite results might be due to certain reasons: 1st, the differences in perceptions and assessments of picky eating, 2nd, failure to adjust various confounding factors including age, gender, birth weight of the child, and socio-demographics.

Cognition and intellectual status of school children is very relevant, and is often concerning for parents. Certain studies indicated that nutrition during early childhood had long-lasting impacts on the intelligence of children. (Benton, 2010, McAfee et al, 2012). As the brain grows and develops faster than the rest of the body, nutrient deficiency, especially protein, iodine, iron, zinc, folic acid, and vitamin B 12, at a critical stage of development may result in everlasting changes in brain structure and cognition status (Benton, 2010).

In comparison to non-picky eaters, selective eaters usually have a restricted dietary variety and limited consumption of few fruits, vegetables, and meat rich in micronutrients (Shim et al., 2011). Moreover, their intake of fats, fibre, protein and sweets is lower than that of non-picky eaters (Galloway et al., 2005). It is unclear whether the impact of picky eating on height and weight depends on the variety of food rejected by the picky eaters. However, in one study a lower intake of vitamin E and C, and fibre was found in picky nine-year-old girls (Galloway et al., 2005).

Subjects and Methods:

This is a cross-sectional descriptive study used a structured questionnaire to obtain information from parents in Iraq/Kurdistan region who were parents to children aged 2–4 years. Participants were randomly selected from Zakho General Hospital-Department of Pediatrics, Nutrition Rehabilitation Center and private clinic for general pediatrics, child's nutrition and growth in Zakho-Duhok city in Iraq to meet pre-specified allocations for race, age, and gender, representative of the national population. A total of 800 participants (400 from each place) who met the eligibility criteria were enrolled and included in this study.

Interview process

The interviews were scheduled, managed and enrolled by the authors themselves. Children aged 2–4 years old who had history of chronic illnesses, that might negatively impact their food behavior, were excluded for instance: prematurity, low birth weight (<2,500 g), dental diseases, organic diseases, mental disorders such as cerebral palsy, genetic diseases, psychiatric illness, anorexia, gastro-esophageal reflux disease, esophagitis, food allergies, and lactose intolerance. As well as those preschoolers with acute illness such as flu or diarrhea were all excluded.

Data for this study were collected between September, 2018 and July 2019. All participants gave their written and informed consent signed by their legal guardians. Using a multi-stage stratified cluster sampling method, 800 children aged 2–4 years were recruited. Data collection were obtained in this study through face-to-face interviews with the children's parents. The participants were all eligible to share in this study.

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In addition, participants with low or limited economic means to support their children's diets, had inadequate concept for children's nutritional support, development, and physical activities, or were unable to provide adequate nutrition for other reasons, were also excluded in this study.

Socio-demographics and anthropometric measurements

The authors, after confirming eligibility, contacted families and arranged a meeting with parents for a face-to-face interview. The socio-demographic information was collected from the parents with a structured questionnaire survey (mothers: 99% of parents), and was administered by trained interviewers. Demographic data included child's date of birth, gender, ethnicity, and birth weight. As well as Data including any medical history of child's food allergy history and parents' body weight and height were also considered from the interview.

All participants were interviewed to gather socio-demographic data, as well as weight and height for age. During interview process we considered food preferences, eating behaviors, general development, physical activity, health questionnaire, and health status by questionnaires. The interviews took approximately 20–30 min to complete. Socio-demographic data were collected using a parental form, which included questions about educational level and number of children in the family.

The food, general health, and medical questionnaires mostly comprised closed-ended categorical questions, with listed options for respondents to select. The main questions included children's food favors, dietary habits, parent/child interactions during meal-times, language ability, developmental behaviors, level of physical activities, and records of medical illness in the last year. As the survey was quantitative, no detailed discussions were conducted. The author carried out the interviews between the 1st of April and the 31 of June, 2019. A written informed consent were obtained from All parents of children who were participants in this study.

Growth and Nutritional Assessment of preschoolers

Children's weight and height were measured in Zakho General Hospital–Nutrition Rehabilitation Center–Department of pediatrics on an individual and solicited basis, before the interview associated with the food frequency questionnaire. Children were weighed without shoes and wore light clothing. These measurements were used to derive body mass index (BMI) [weight (kg)/height (m²)]. To evaluate the impact of picky eating on growth and nutritional status, the percentile and z-score of weight-for-age, height-for-age, and BMI-for-age were considered.

Weight-for-age, weight-for-height, and height-for-age were expressed as gender and age-specific percentiles, and the growth standards for height, weight, and BMI based on a general WHO population were used to obtain z-scores for each measurement according to age and sex (30).

The used parameters to assess growth status were height-for-age and weight-for-age z-scores, and those used to evaluate nutritional status were weight-for-age and BMI-for-age z-scores. Weight-for-age, height-for-age, and BMI-for-age percentiles <15 were considered to indicate that the child was underweight, of short stature, or suffering from malnutrition, correspondingly.

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Assessment of Picky Eating

The questionnaire for food preferences and eating behaviors addressed two general areas (food preferences and eating behaviors).

Food Preferences

In an organized questionnaire, all parents were questioned about their child's food preferences. Questions about preferences for food and food variety included a modified version of a questionnaire based on the United Kingdom Department of Health Survey of the Diets of British School Children (14) and dietary assessment among school-aged children (15). The modification of the questionnaire was based on Iraqi dietary culture and food habits. The questionnaire included two major items: (1) child's foods (meals) and their preferences in seven food categories: (i) grains (rice, bread, cereals, potato, noodles, etc.), (ii) protein foods (meats, fish, seafood, beans, etc.) (iii) vegetables, (iv) fruits, (v) dairy foods (milk, cheese, yogurt, etc.), (vi) fats and oils (vegetable oil, butter, cream, salad, etc.), and (vii) snacks and sweets (candy, cookie, cake, etc.) in past 15 days, (2) preferences in common foods (list of 50 foods for regular meals).

The responses were "tried and not tried" in each food and responding to preferences of the tried foods. Items were scored on a five-point scale as "like very much," "like moderately," "neither like nor dislike," "dislike moderately," and "dislike very much."

Feeding and Eating behaviors

A separate section asked parents about their feeding behaviors (six items: four appropriate behaviors, two inappropriate behaviors) and their child's eating behaviors (six items: two healthy eating behaviors, four picky eating behaviors). The eating behavior questionnaires were inspired from the Children's Eating Behavior Questionnaire developed by Wardle et al. (16), the classification of feeding disorders of infancy and early childhood by Chatoor and Ammaniti (10) and a study about the trends of eating behaviors in preschool children (17). The four questions for picky eating behaviors included (i) eats limited foods (usually eat fixed foods or have strong like with regard to food, such as cooked foods, milk, or sweets), (ii) unwillingness to eat regular meals, (iii) unwillingness to try new foods, and (iv) refusal of one or multiple food groups in six major food groups (grains, protein foods, vegetables, fruits, dairy foods, and fats and oil). Items were scored on a five-point scale as "never," "rarely," "sometimes," "often," or "always." Mean scores were calculated for each subscale (range 1–5) with higher scores indicating higher values of each trait.

A positive response of "always" to at least one item of the picky eating behaviors on questionnaire of eating behaviors was defined as picky eating.

Assessment of Development

The questionnaire for assessment of development was modified based on the Denver Developmental Screening Test II to screen children's development in four areas of functioning: fine motor-adaptive, gross motor, personal-social, and language skills. Statements relating to development requested respondents to rate their degree of agreement on a five-point scale (unacceptable, improvement expected, acceptable, exceeding expected, outstanding). Mean scores were calculated for each subscale (range 1–5) with higher scores indicating higher values of each trait.

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Development was evaluated based on the outcomes of three categories (eight items): learning ability (two items: attention and learning); verbal development (three items: verbal development, language learning, confluence in speech); and interpersonal relationships (three items: adaptation to new environments, cooperation, adaptation of being separated from relatives). The answers of “unacceptable” or “improvement expected” of the item assessed were considered as having slow, poor, or deficient development. Those participants with one or more of low quality items in each category of development were defined as having low quality general development (learning disability, poor verbal development, or negative interpersonal relationships).

Assessment of Physical Activity

A modified questionnaire for assessment of physical activity was used based on a study of objective measurement of physical activity and sedentary behavior (18). Statements relating to physical activity requested respondents to rate their degree of agreement on a five-point scale (unacceptable, improvement expected, acceptable, exceeding expected, outstanding). Mean scores were calculated for each subscale (range 1–5) with higher scores indicating higher values of each trait. The questionnaire assessing physical activity consisted of four items: normal-pace walking; sport activities; stair-climbing; and running. The answers of “unacceptable” or “improvement expected” of the item assessed were considered as having low level physical activity. Those with two or more low-level physical activities were defined as having a poor general physical activity level.

Results and findings

Data and Characteristics

In this cross sectional study, eight hundred preschoolers aged 2–4 years were screened, of whom 740 met eligibility criteria were enrolled. Sixty participants were excluded, 30 preschoolers had chronic illnesses affecting eating habits and growth status, 15 caregivers had limited economic means to support their children’s diets, and caregivers did not have enough concept for children’s nutrition support, development, and physical activities or were unable to provide adequate nutrition for other reasons.

Table 1 illustrates the demographic variations between picky and non-picky eaters. Based on the food and dietary questionnaire survey, 620 preschoolers (77%) were found to have picky-eating behavior. The mean age of these children was 2.97 ± 0.59 years. Certain factors such as gender, age, primary caregiver, education levels of caregiver, or family size between the participants have no statistical variations in this study.

Biography

Khajik Sirob Yaqob, MA is a specialist in child nutrition with interest in pediatric neurology. He has Associate Membership of the RCPCH; Membership of Oxford University Hospitals and he is a Member of American Academy of Nutrition and Dietetics; Member of Kurdistan Pediatric Society, Iraq.

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