

## Ramadan fasting in children

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### Abstract

Fasting during Ramadan is obligatory for all able bodied adult Muslims. Though children are exempt from fasting, many children (and their parents) do observe the Ramadan fast. Responsible diabetes care professionals are expected to offer appropriate and pragmatic advice to children in their care. This communication describes the physiology of fasting in children, and assists physicians in sharing medically accurate information with them. Counselling regarding fasting must be made an integral part of diabetes care in Ramadan-observing families.

**Keywords:** Fasting, paediatric diabetes, patient centred care, Ramadan, responsible patient centred care.

### PHYSIOLOGY OF FASTING

Fasting is accompanied by various physiological changes which follow a hierarchical pattern. The first 6-24 hours of fasting are categorized as a post absorptive stage, in which glycogenolysis meets the glucose requirements of the body, including the brain. Once hepatic glycogen stores have been used, gluconeogenesis is stepped up. The glucogenic amino acids, glycerol, pyruvate and lactate, allow glucose needs of the body to be met for up to 2-10 days. Muscle glycogen (which forms lactate) and muscle protein (which contains alanine) are utilized to maintain the body and brain, at the cost of skeletal muscle wasting. This gluconeogenic stage is followed by a stage of protein conservation. After 10 days of continuous fasting, fat stores are utilized for ketogenesis in the liver. This helps conserve muscle mass, while allowing the brain to function on ketone bodies, and muscle to utilize fatty acids. Similar changes, albeit to a lesser extent, are noted in the intermittent fasting that occurs during Ramadan<sup>1,2</sup>.

### FASTING IN DIABETES

Fasting in persons with diabetes, and especially in children with diabetes, is associated with the same

physiological changes. However, lack of insulin reserves leads to acceleration of the temporal profile of these adaptive changes, and does not prevent the adaptive changes (such as ketogenesis) from worsening into maladaptive clinical states (ketoacidosis)<sup>3</sup>.

### CHALLENGES IN CHILDREN

Religious guidance provides exemption to children from fasting .yet, many children and adolescents choose to fast during Ramadan<sup>4</sup>. The duration of fasting varies according to the latitude of residence and the season of the year. Fasting times increase with higher latitudes, and are longer when Ramadan occurs during summer. This may influence feasibility and impact of fasting in children. Children living in extreme latitudes may find it challenging to fulfill the obligations of Ramadan fasting. A similar challenge is faced in hot climates, where intense heat predisposes to dehydration and heat exhaustion. Occurrence of school examinations, or school holidays, during the month of Ramadan, may influence decision making regarding the fast as well.

Small children have low glycogen stores, and are thus more prone to hypoglycaemia, even during fasts of short duration. This frailty is compounded by the higher metabolic rate that children have. Fasting may progress to dehydration and ketoacidosis more rapidly in children than in adults. Cardiovascular instability, discomfort, hunger, thirst and grumpiness have been noted in children made to fast prior to surgery.<sup>5</sup>

Hypoglycaemia occurs relatively more rapidly in children who fast. This is seen in normal children, without metabolic or endocrine disorders. The rapidity of hypoglycaemia and ketosis depends upon age. Children aged 0-24 months experience ketosis and hypoglycaemia more than those aged 25 to 84 months. Children aged 85 to 216 months<sup>6</sup> are also prone to fasting-induced metabolic derangement.

Ramadan fasting modifies the daily lifestyle, diet pattern and metabolic milieu. This change is more pronounced in children, who often take the opportunity to indulge in otherwise restricted foodstuffs. The change in sleep pattern that is necessitated by Ramadan fasting may impact scholastic performance.

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## AVAILABLE GUIDANCE

The United Kingdom's National Health Services states that fasting is not harmful for children, but advises younger children, aged 7-8 against fasting. The NHS also suggests graded exposure to fasting, so that children are made aware of its requirements<sup>7</sup>. Insight may also be gleaned from guidelines on preoperative fasting for children. All modern anaesthesiology guidelines strongly support minimization of the fasting period. A 6-4-2 advice (fasting of 6 hours for solids 4 hours for breast milk, and 2 hours for clear fluids) is advised<sup>8</sup>. Prolonged fasting may have detrimental effects on the metabolism and behaviour of small children.

## LIMITED EVIDENCE

Original research on Ramadan fasting in children and adolescents is limited. A prospective cohort study from Qatar observed 18 healthy Muslim boys, aged 12.6±1.5 years, to assess the physiological and neurobehavioral effects of Ramadan fasting<sup>9</sup>. Interestingly, the participants reported a significant increase in fat and protein intake during Ramadan. Preteenagers were observed to have a reduction in body fat percentage, haemoglobin and serum iron. Neurobehavioural effects of fasting were mixed: preteens exhibited a worsening of performance in match-to sample test. Overall, the children reported a significant improvement in spatial planning, working memory task, and working memory capacity test scores, their sleep duration decreased by 1.8 hours during Ramadan.

## PRAGMATIC SUGGESTIONS

Diabetes care providers should incorporate discussion

regarding the physiological and potential pathological effects of fasting while counseling children with diabetes, and their families. This topic may be brought up proactively with children from Ramadan observing families. The knowledge and experience gained from these conversations will help in managing other conditions such as eating disorders.

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