

## The Effect of Dental Rehabilitation under General Anaesthesia on Vital Health Parameters Of Children with Mental Retardation

Research Article

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### Abstract

**Objectives:** To determine the effect of complete dental rehabilitation under general anaesthesia on the general health of mentally retarded children.

**Subjects and Methods:** Fifty-two children with mental retardation ( $IQ \leq 70$ ) received dental treatment under general anaesthesia and followed up after 6 months to determine the changes in body weight, serum ferritin, albumin and hemoglobin.

**Results:** Body weight, serum hemoglobin and ferritin were increased significantly at 6 months after treatment.

**Conclusion:** Dental rehabilitation under general anaesthesia is the most successful method of treatment for mentally retarded children.

**Dental Implication:** Early dental treatment of mental retarded children will improve their general health conditions.

**Keywords:** Dental Rehabilitation; General Health Condition; Mentally Retarded Children.

### Introduction

Mental retardation is defined as a generalized disorder appearing before adulthood, represented by obviously impaired cognitive functioning and deficits in two or more adaptive behaviors. Historically, it has been defined as an Intelligence Quotient score under 70 [1]. Children with intellectual disability have increased levels of early childhood caries, un-restored and over retained primary teeth and many lost teeth [2].

Manifestation of early childhood caries may go beyond pain and infection; the condition may also affect the child's general health. Acs et al. [3], indicated that, children with early childhood caries weighed significantly less than their matched controls.

The priority of dental research has shifted from causes of dental diseases to how dental diseases affect general health. If a common condition, such as untreated dental caries, which affect the

growth, then dental interference to eliminate dental pain and pulpitis is an important way to enhance well-being and growth in young children [4].

Dysphagia has been reported to be related to reduce weight or height and growth impairment. Furthermore, dietary insufficiency in children with mental retardation plays a role as a cause for iron deficiency. Iron deficiency can be aggravated by dysphagia which is another health problem in those children [5].

A low serum ferritin and a low serum iron level are diagnostic tests to diagnose body store iron deficiency. The most sensitive lab test for iron deficiency anemia is a low serum ferritin [6-9]. The most abundant protein in human blood plasma is Albumin; it encompasses about half of the blood serum protein [10].

Many special needs patient have limited communication skills and are unable to express their pain. From the primary techniques for

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treating those children in the dental chair are non-pharmacologic behavior management techniques. Despite advances in behavioral science, treatment in the normal setting still remains impossible to treat those patients conventionally [11].

General anaesthesia is a necessary and important behavior management technique which confirms optimum conditions to perform complex dental procedures and complete oral rehabilitation in a minimal length of time [12-14].

The present study was carried out to determine the effect of complete dental rehabilitation under general anaesthesia on the general health of mentally retarded children.

## Materials and Methods

### Study design and ethical approval

The present study was a quasi trial carried out at the dental clinic of Pediatric Dentistry Department after obtaining the ethical approval from the Research Ethics Committee, Faculty of Dentistry, Cairo University, Egypt. Written informed consents were obtained from the children's parents after understanding the aim of the study.

### Sample size calculation

The target population was mental retarded children aged from 2 - 8 years old seeking dental treatment. By calculating the sample size with confidence interval 95% and expected improvement in general health parameters of 80%. The calculated sample size was 48 subjects which increased to 52 subjects.

### Subjects

The study population included two to eight years old mentally retarded patients (IQ ≤ 70) with multiple dental defects who presented at the general anaesthesia Clinic, Pediatric Dentistry Department, Faculty of Dentistry, Cairo University.

### Clinical intervention

#### For each patient:

- 1- Preoperative medical evaluation including: past medical history, physical examination, current medications, previous allergies to certain drugs or anesthetics and chest examination was done by the anesthesiologist.
  - 2- Dental history was obtained including previous dental history and history of pain.
  - 3- Risks of general anaesthesia were emphasized including nausea, vomiting, prolonged sedation and altered mood.
  - 4- Risks of dental treatment were emphasized including post-operative pain, bleeding and swelling.
- After explaining the risks to parents, an informed consent was obtained, and blood investigations were required that include (complete blood count CBC and bleeding time).

**The day of operation:** 1- Preoperative evaluation was done again by the anesthesiologist to evaluate the patient's ability to

tolerate treatment and to avoid potential complications under general anaesthesia.

2- Children body weight was recorded by a well calibrated graduated scale.

### In the operative theatre:

Blood samples were collected from the cannula for blood investigations preoperatively before induction of general anaesthesia for:

- 1- Complete Blood Counts (CBC)
- 2- Serum albumin
- 3- Serum ferritin

All required dental treatment including extraction of badly destructed teeth, filling, pulpotomy and stainless-steel crown were carried out and finished in the same appointment. Post-operative oral hygiene instructions were provided to their caregiver to maintain good oral and dental health status.

### After 6 months

- 1- The children body weight was measured by the same scale.
- 2- Blood samples were taken again for CBC, albumin and ferritin and sent to the same lab (Medical Biochemistry Department, Faculty of Medicine, Cairo University).
- 3- Oral examination was done to check the integrity of restorations and observe any other changes in the soft and hard tissues.

### Statistical analysis

Data were collected, revised for completeness, logical consistency and tabulated. Statistical analysis for body weight, albumin, ferritin and hematological scores were done using SPSS version 21 (IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp) Program. Data was presented as mean ± standard deviation, Paired *t*-test was used to compare between before and after treatment measurements for different variables. P value was considered statistically significant at level ≤ 0.05.

## Results

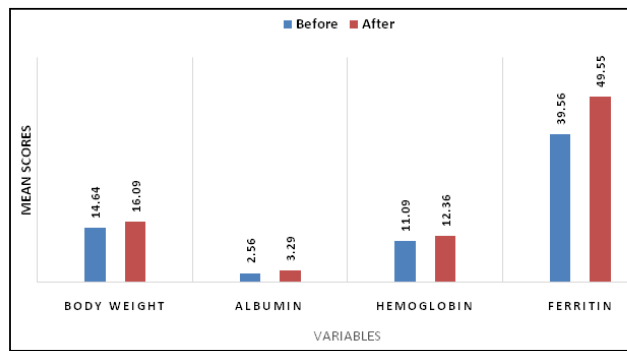
The results indicated that, body weight, albumin, ferritin and hemoglobinscores were increased significantly after 6 months of treatment (P=0.000 for all variables) (Table 1 and Graph 1).

**Table 1. Body weight, serum albumin, Hemoglobin and Ferritin scores before and after dental rehabilitation.**

Variables	Before	After	p
Body weight	14.817 ± 2.516	16.293 ± 2.835	0.00
Albumin	2.572 ± 0.289	3.297 ± 0.369	0.00
Hemoglobin	11.091 ± 0.218	12.371 ± 0.434	0.00
Ferritin	39.691 ± 1.967	49.764 ± 3.732	0.00

p= p value calculated by paired t test.

**Figure 1. Changes in body weight, serum albumin, Hemoglobin and ferritin after dental rehabilitation.**



## Discussion

Although, the epidemiological research on health and illness among intellectual disabilities is delayed the interest in the quality of life of them has grown, when compared to similar research on healthy individuals. The children with intellectual disabilities have poorer oral and dental health than does the general population [9, 14], thus the present study was carried out to evaluate the effect of dental rehabilitation under general anaesthesia on general health parameters of those mentally retarded children.

Intellectually disabled children may require assistance or support from care givers to maintain their oral health. Barrier to care have arisen as a result of the movement to bring children with disability out of institutions and into communities. The task of finding dentists who can treat special-needs child may be especially challenging for children with limited literacy skills. Specialized care, such as sedation or general anaesthesia, may be required because of the intensity of oral disease or the child's inability to cooperate with treatment [15].

There is a high prevalence of anemia among individuals with mental inability, high sucrose diets are of concern since it has been proposed that such diets may be low in micronutrients and may compromise nutrient inlet [8, 9, 16]. A lot of previous studies concluded that, rampant dental caries restrained satisfactory nutrition, in this manner unfavorably influencing the growth of the body, particularly weight [7, 9, 17].

The results of the present study showed that, there was significant improvement in the body weights of the children (Table 1). This improvement supports the results of El-Motayam's study [10]. On the other hand, the present results were not confirming the results obtained by Filstrup et al. [17] study where they concluded that, changes in body weight were not significant although there was an improvement in quality of life of healthy children as reported by their parents.

The increase in body weight in the current study may be due to improvement of mastication after extraction of painful badly decayed teeth and restoration of defects, the increased ability to eat giving chance for more food nutrients to be introduced. Body Mass Index was not used in this study because BMI is used to judge the obesity status and screening populations for obesity and underweight in adults (>18 years) and adolescent and it is not suitable for children with intellectual disability [18].

The limited research regarding the nutritional status of severe early childhood caries (S-ECC) children has involved weight as a sole estimation in dietary well being. A limitation of such investigation is that, the utilization of weight as the sole measure of nutritional status does not account for the multifactorial nature of the clinical evaluation of nutrition [9, 16].

Blood tests detect more cases of nutritional deficiency than body weight alone. The most remarkable blood tests are those for albumin, hemoglobin and serum ferritin [8, 9]. The change in serum albumin was significant in our study and this may indicate that, the children's dietary intake of protein was improved.

Hemoglobin has been broadly acknowledged as a vital list of nutritional status; subsequently it is of esteem to explore the relationship between anemia and the life prognosis of our participants. In the current study the overall change in hemoglobin levels was statistically significant and these results were agreed with the results obtained by previous studies [9, 10].

Low levels of hemoglobin or ferritin indicate malnutrition. Low ferritin is proving that, the body has drained capacity of iron to preserve hemoglobin at an appropriate level for good health. Some children may have acceptable levels of hemoglobin but low levels of serum ferritin. This implies that children had deficiently admissions of iron to preserve acceptable levels of either hemoglobin or serum ferritin [8, 9, 19]. The present results indicated that, there was a highly significant increase in ferritin levels and this increase may be due to improved nutrition after dental rehabilitation.

Many patients who require general anesthetize have significant medical histories and developmental disabilities [14]. It is certainly in the best interest of the child to provide definitive, durable, comfortable and functional restorations and minimize the amount of time spent in a dental office. Definitive treatment that is intervention intended to minimize further complications or follow ups is the approach to take when working under general anaesthesia with this population of children [15]. Finally, dental treatment and dental rehabilitation would increase growth rates and the quality of life of millions of children [4, 9].

## Conclusion

Dental rehabilitation under general anaesthesia is the most successful method of treatment for mentally retarded children. Early dental treatment of these children will improve their general health conditions.

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