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RETROSPECTIVE STUDY OF RENAL INJURY IN PEDIATRIC ANOREXIA NERVOSA

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ABSTRACT

Because most studies have focused on adult populations, little is known regarding the consequences of AN in children and adolescents. Renal problems affect about 70% of AN patients at some point in their life, with a 5.2 percent chance of developing significant kidney disease, including deadly renal failure, after 21 years of AN. Fichter et almortality .'s research has recently yielded some interesting results. The goal of this study was to assess the renal function of hospitalised AN patient by measuring creatinine levels in the blood and determining the glomerular filtration rate using several formulae (GFR). In this study, the connection between GFR and intrinsic patient variables was also investigated. Cockroft–Gault, Modification of Diet in Renal Disease (MDRD), Chronic Kidney Disease-Epidemiology Collaboration (CKD-EPI), MAYO Clinic Quadratic equation (MCQ), and Schwartz formulae were used to calculate it (Annex 1). Unless otherwise noted, the GFR test results were adjusted to the body surface area (standard = 1.73 m2) in order to draw comparisons. The mean plus standard deviation (mean + SD) was used to report continuous variables. 45 percent of the 51 patients had a GFR of less than 90 mL/min/1.73 m2 using the Cockroft–Gault formula, compared to 28 percent using the MDRD method, 14 percent using the CKD-EPI formula, 12 percent using the MCQ formula, and 4% using the Schwartz formula. Renal issues in adolescent anorexic patients are given little attention in this therapeutic setting, leading in poor results. More study is needed to understand the link between GFR and refeeding, as well as the long-term effects of severe starvation on the kidney.

Keywords: Renal injury, Paediatric anorexia, GFR, MDRD

INTRODUCTION

Because of a number of circumstances, anorexia nervosa (AN) has become a fairly frequent illness among teens in recent years. Despite the claim that anorexia is primarily a mental illness, it has a number of physical consequences that can be lasting or even deadly. On the other hand, the nephrological effects are still little known.

Anorexia is defined by DSM-5 [1] as a decrease in energy intake leading to significantly lower body mass index than expected. Even when a person is already underweight, the disease is accompanied by a strong fear of weight gain or a continuous behavior that prevents weight gain. Patients' perceptions of their body weight are often flawed, and they fail to recognize the value of their subconscious state when diagnosed.

When there has been no purging behaviour in the previous three months, the kind of anorexia nervosa is described as restrictive. Essentially, weight loss can only be achieved by decreasing food consumption, fasting, or engaging in physical activity. Restrictive anorexia is more common in children and adolescents, while overeating / vomiting anorexia is more common above the age of sixteen. We know a lot about the acute problems of anorexia, such refeeding syndrome, cardiac issues, and electrolytic abnormalities, but we don't know much about the chronic complications, like renal troubles. Because most studies focus on adults, little is known about the effects of AN on children and adolescents. [2]

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Kidney failure was the cause of death for two of the 31 AN patients who died from natural causes, according to the latest data from a mortality study by Fichter et al. [4]. Despite the fact that these diseases were not medically defined, 97 French people treated for angina reported cystitis, 2.1 percent reported kidney stones, and 1% reported renal colic after receiving treatment for the disease [5]. Kidney problems are a common result of anorexia and should be carefully controlled in the medical setting.

AIMS AND OBJECTIVES:

The aim of this study was to evaluate the kidney function of patients with AN in the hospital by measuring creatinine levels in the blood and determining the level of glomerular filtration using several formulas (GFR). In this study, the connection between GFR and intrinsic patient variables was also investigated.

METHODS:

In this single-center, retrospective cohort research done in 2013, 51 patients were hospitalised at south Indian tertiary hospital for acute malnutrition owing to restrictive AN. (DSM-5 criteria were used to make the diagnosis.) Hospital's ethics committee approved this study. Any exceptions other than malnutrition that may have impaired kidney function have been omitted from the study to reduce gender bias in the GFR count. Bulimia, a drug that inhibits kidney function, as well as existing kidney disease or urinary incontinence were all listed (unrelated to AN). To eliminate gender bias in GFR counts, boys were also excluded from the study.

Information was organised as 3 divisions:

Each woman's weight and body mass index [BMI = weight (kg)/height (m2)], the rate of undernutrition and weight loss, the length of the disease, her pubertal status (pre- or post-menarche), and the duration of amenorrhea should be documented.

• The following clinical parameters were recorded upon admission: age (in months), weight, height, BMI, minimum heart rate (in beats per minute), and blood pressure (in millimetres of mercury) for the first three days of hospitalisation.

• Complete blood cell count, Minimum blood glucose, blood urea nitrogen (BUN) levels, blood electrolyte concentrations (Na, K, Cl, Ca, Mg, and P), plasma creatinine levels, and Alanine Aminotransferase levels were all acquired on this admission (if applicable) (ALT).

Standard deviation (SD) was used to describe the difference between anthropometric measurements (i.e., weight, height, and body mass index (BMI)) and the average predicted for the age.

It was determined by utilising the following formulas: Cockroft–Gault, Modification of Diet in Renal Disease (MDRD), Chronic Kidney Disease-Epidemiology Collaboration (CKD-EPI), MAYO Clinic Quadratic equation (MCQ), and Schwartz formulas (Annex 1). Unless otherwise noted, the GFR test results were adjusted to the body surface area (standard = 1.73 m2) in order to draw comparisons. The mean plus standard deviation (mean + SD) was used to report continuous variables. The Pearson test was used to analyse correlations between mean and correlation coefficients, and the Student's t test was used to compare means. In this study, a p value of less than 0.05 was considered statistically significant.

Five of the 64 patients admitted to our centre for AN were boys, and eight had vomited in the days before to admission. The remaining 51 patients were included in the trial after these 13 patients were removed from the study.

Data collected before and after admission to the hospital

The average patient was 14 years and 10 months old at the time of admission (1 year 10 months; minimum 11 years 4 months, 17 years 8 months). The average BMI before the condition was 20.47 3.44 kg / m2, or 0.64 1.46 SD. The average duration of symptoms before admission to the hospital was 12 9.5 months. During the pre-hospital follow-up at an outpatient clinic, an average of 1.8 ionograms was performed per patient. No cases of hypokalemia or hyponatremia were detected. [TABLE 1]

At the time of admission, patients weighed 39.21 6.31 kg (-1.45 0.82 SD) and stood 161.7 8.1 cm (0.53 (1.0) SD tall. With a standard deviation of 1.94 0.68, the average BMI was 14.7 1.63 kg/m2. Before and after admission (DIMC), the difference in BMI was -5.73 2.64 SD. There had been one to four previous hospitalizations, according to the data. Sixteen of the patients (31.4%) had not achieved menarche. The average length of amenorrhea was 7.5 7.32 months among the others.

During hospitalisation, paraclinical and clinical data were collected.

Medium systolic blood pressure was 79.0 millimeters of mercury, while moderate diastolic blood pressure was 45.8 millimeters of mercury. The lowest heart rate was 44 beats per minute (bpm). Table 1 summarizes the average values of several biological parameters during hospitalization.

GFR calculation and comparison

45% of 51 patients had a GFR of less than 90 mL / min / 1.73 m2 according to the Cockroft – Gault formula, compared with 28% using the MDRD formula, 14% using the CKD method -EPI, 12% using MCQ formula, and 4% using Schwartz formula [Table 2].

Table 01: LABORATORY PARAMETERS WITH NORMAL AND EXTREME VALUES.

	BLOOD GLUCOSE	NA	K	P	MG	BUN	SR. CREATININE
VALUE	4.6	138	4.0	1.0	0.9	5.2	72.3
EXTREMES	3.5	135	3.0	0.8	0.8	1.0	42
NORMAL VALUES	3.7	135	3.6	1.4	0.8	2.3	20

TABLE 2 : DIFFERENT SCALES

	COCKROFT -GAULT	MDRD	CKD-EPI	MCQ	SCHWARTZ
GFR	94	107	110	116	125
EXTREMES	51	80	66	54	79
% OF PATIENTS WITH GFR < 90	45	28	14	12	4

Linear regression is a type of statistical analysis:

Linear regression revealed a strong link between normal weight loss / BMI and glomerular filtration damage, regardless of the method used (p \ 0.0001). Other findings revealed that the lowest heart rate in the hospital was associated with lower GFR, but only when GFR was calculated using the Cockroft – Gault equation (p = 0.03).

Discussion

For many years, malnourished AN patient have had lower GFRs [6, 7, 8, 9, 10, 11, 12]. Patients who did not vomit were chosen to limit the potential of hypokalemia, which would otherwise go undetected. In the case of a small limited edition AN with no history of excessive water use even before a severe malnutrition disorder develops, we simply perform a few blood tests during the external follow-up. All were found to be normal or near-normal, and none of them were found to be the cause of the GFR decrease.

In addition to hypokalemia, chronic kidney injury in adult AN patient is likely to be caused by a decrease in intravascular volume due to obstruction, leading to chronic interstitial nephritis [2, 7]. Even in the context of mild malnutrition (BMI = = 1.94 SD), our study showed that adolescent patients had lower GFR.

Although Cockroft–Gault equations were able to detect reduced renal function in anorexics, precise measurement of GFR impairment in this cohort has been problematic [8].

The measurement of serum creatinine alone can be misleading because creatinine levels are lower in anorexic patients as a result of their reduced muscle mass and low protein consumption [9], as previously stated. It is possible that our GFR calculations overstated renal function in these patients because the formulae we used to compute it were based on serum creatinine readings.

There has been a lot of debate in the literature over which formula is the most suited for calculating GFR. According to the study, both the MDRD and the Cockroft–Gault formulas underestimated renal glomerular filtration in an underweight adult population [11]. Despite claims that the MCQ equation is the most dependable, this result was obtained based on observations from a diverse sample and should be viewed with care [7]. It is also the only formula that has been shown to have an important relationship between patient weight [12] and GFR (plasma clearance following single CrEDTA injection) in anorexic adults [10, 11].

It has been suggested that Cystatin C is less related to muscle mass than creatinine and may better reflect the presence of tubular dysfunction [10]; Unfortunately, at the time of our study, it was not possible to measure Cystatin C in our hospital, so we used creatinine, which is the standard of care for most facilities.

Kidney problems are rarely diagnosed when hospitalized due to a lack of published published data and diagnosis of kidney defects in patients with AN. However, while breastfeeding or treating people with anorexia with nephrotoxic drugs, it is important to consider their kidney function.

As a result of these findings, dehydration may not be the only cause of kidney failure in patients with AN. Kidney damage from AN can be caused by both chronic volume loss and chronic hypokalemia, both of which can lead to tubulointerstitial nephritis [1, 5]. We were left with malnutrition as the only factor leading to kidney damage after excluding people who were at high risk for hypokalemia (i.e., those who participated in behavioral cleansing).

In adults with AN, the duration of the disease has been identified as a high risk of kidney damage, and the use of laxatives, the presence of laxatives, and low serum potassium have all been identified as risk factors [12]. We were unable to determine the duration of the illness as a risk factor for kidney damage in our analysis due to the shorter duration of the disease in our sample of children compared to the number of adults. However, we think that kidney damage may occur at the onset of an anemia patient, and that proper breastfeeding is essential to maintain kidney function. According to the findings of our investigation, bradycardia is associated with a decrease in creatinine clearance. Because of enhanced parasympathetic

tone reduction, it is possible that this link is caused by poor glomerular perfusion and filtration rates. Decreased heart rate, reduced blood pressure, and decreased blood pressure due to dehydration all contribute to decreased renal blood flow to the AN. Despite the fact that intravascular volume reduction is highlighted in a few studies looking at kidney involvement in AN patient, no studies have looked at this parameter and its direct effects on glomerular filtration level. This is a very possible option, but there are a few other options you can explore. For example, we can assume that the patient's renal function may be affected by his or her relative functional hypothyroidism. We infer that the correlation is the result of two impacts of a substantial alteration in metabolism in the setting of acute starvation and adversity, rather than a cause-and-effect relationship. To acquire a better knowledge of the physiopathology of renal function in these people, more study is needed.

CONCLUSION:

In this clinical context, renal problems in juvenile anorexic patients are given insufficient attention, resulting in poor outcomes. More study is needed to understand the link between GFR and refeeding, as well as the long-term effects of severe starvation on the kidney. We can advocate combining estimated GFR with measured creatinine clearance in a single computation for the most severe cases. When it comes to the diagnosis of kidney impairment, a reliable and least intrusive approach of measuring renal function should be used.

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