



Effects of Chronic Gastritis on Sleep and Quality of Life in Adolescents

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ABSTRACT

Aim: This study aims to evaluate the sleep quality and the quality of life (QoL) of adolescents with chronic gastritis, and determine the related factors.

Materials and Methods: This study included patients who were diagnosed with chronic gastritis both clinically and histopathologically. The Pittsburgh Sleep Quality Index and Epworth Sleepiness scale were used to assess sleep quality, and the Pediatric Quality of Life Inventory was used to assess QoL. The control group included healthy volunteers with no chronic diseases and no gastrointestinal system complaints.

Results: Fifty-six patients with gastritis and 55 healthy volunteers were included. The patients with gastritis were found to have significantly lower overall QoL subscale, and total scale scores, except for the social functioning total score. Except for the subjective sleep quality, significant differences were seen between the groups in the sleep quality subscale, total scale, and sleepiness scale averages. The total score of the sleep quality scale was significantly higher in patients who had lower incomes than expenditure. There were no significant differences between the obese or overweight patients with gastritis and the rest of the gastritis patients in the study sample. There were no significant differences found between the *Helicobacter pylori* positive and negative gastritis patients in terms of the total QoL and sleepiness scale scores.

Conclusion: This study is important because it is the first study in adolescents in this respect. The sleep and QoL scores of those adolescents with chronic gastritis were lower than the control group.

Keywords: Gastritis, quality of life, sleep, adolescent

Introduction

Gastritis is defined as the inflammation of gastric mucosa with microscopic evidence (1). Gastritis and peptic ulcer disease are the results of an imbalance between the mucosal defensive and aggressive factors. Gastritis and peptic ulcer disease can be divided into two major categories: namely primary and secondary (such as hypersecretory

conditions, stress, granulomatous and immunologic/allergy situations) on the basis of the underlying etiology (2). Most cases of primary or unexplained gastritis are now known to be caused by *Helicobacter pylori* (*H.pylori*) (3). Data on acid secretion in children are limited and not up to date and their interpretations complicated by the considerable overlap in acid secretion between children with and without ulcers

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(4). There are no accurate figures related to the precise incidence of gastritis in children. As for ulcer disease, *H. pylori* is probably no longer the major cause of gastritis in many parts of the world (5). In a prospective study of 100 children who underwent upper gastrointestinal system (GIS) endoscopy due to dyspeptic symptoms, 79% were found to have gastritis (none had ulcer disease), of whom only 33% had *H. pylori* infection (6).

The Sydney classification of gastritis aims to combine topographic, morphologic, and etiologic information to form a clinically relevant scheme (7). This classification and grading, which now incorporates the use of a visual analogue scale, is accepted as the standard research method by which all gastric biopsies from adult patients are commonly assessed (8). The updated Sydney system is currently the most widely accepted classification for gastritis, even in children (8).

In gastritis cases, the etiological factors and the patient's response to the inflammation may change the clinical findings. Inflammation of the gastric mucosa is among the most frequent causes of abdominal pain in children (9). Gastritis can affect an individual's daily activities, and this creates an important health problem from both the social and economic points of view. Gastritis may lead to an observable worsening in the quality of life (QoL) and affect the quality of sleep for adult patients (10,11). There are no studies in the contemporary international literature that are focused on the quality of sleep and life in children and adolescents with gastritis. Therefore, this study aimed to conduct an evaluation of the sleep quality and life quality of children and adolescents with gastritis and identify the relevant factors.

Materials and Methods

Study Population

This study included patients between the ages of 13 and 18 years old who applied to İzmir Tepecik Training and Research Hospital Pediatric Gastroenterology Clinic between August 2017 and October 2017 and received clinical and histopathological chronic gastritis diagnoses. These patients underwent upper GIS endoscopies; gastric biopsy samples were taken from the antrum and corpus due to gastrointestinal symptoms (such as chronic abdominal pain, dyspepsia, vomiting, and abdominal distention) that had been ongoing for at least one month (8). Patients diagnosed with a disease other than gastritis via clinical, endoscopic, and histopathologic findings (such as eosinophilic esophagitis, reflux esophagitis, or

inflammatory bowel disease) were not included in this study. In the literature, it has been shown that children may experience impaired QoL and sleep in different chronic diseases (12-14). For this reason, gastritis patients with additional chronic diseases were excluded from this study. Upper gastrointestinal endoscopy biopsies were assessed according to the Sydney classification by a pathologist. Those adolescents who were found to have chronic gastritis, with no additional chronic disease and additional histopathologic findings in the pathology reports and who agreed to participate in the study were included. The Pittsburgh Sleep Quality Index (PSQI) and Epworth Sleepiness scale (ESS) were used to evaluate sleep quality. QoL was evaluated via the Pediatric Quality of Life Inventory (PedsQL), which is suitable for this age group. Only those children who could read, understand, and complete all of the scales used were included in this study.

The data obtained was assessed via comparisons with a healthy control group. Healthy controls were selected from healthy volunteers who presented to the pediatric gastroenterology and pediatric outpatient clinics. For the comparisons, the sleep and life quality scales were applied to a group of healthy volunteers of the same age and gender who did not have any chronic diseases or GIS complaints. The patients' demographic findings, complaints during application, endoscopic findings, and *H. pylori* positivity status were identified and evaluated together with the life and sleep qualities. In addition, the relationship between the income levels of the patients and sleep quality was assessed. For this purpose, patients were divided into three groups as follows; patients whose income is lower than their expenditure, patients whose income is equal to their expenditure, and those patients whose income is higher than their expenditure, the patients were asked to state their income status accordingly. Each patient's body mass index (BMI) percentile was determined according to their age and sex, and those with BMI \geq 95 percentile were considered as obese, while those with a BMI between the 85th and 95th percentile were classified as overweight (15). In addition, the relationship between BMI and the life and sleep qualities were assessed. Healthy volunteers with normal BMI ratios that ranged between the 5th and 95th percentiles were included in the control group. Children who were not in the 5 to 95 percentile range were not included in the control group. Neither the patient nor control groups had any drug use or acid suppressive treatment history and did not have any diseases that could affect sleep quality, such as sleep apnea.

The study was approved by the University of Health Sciences, İzmir Tepecik Training and Research Hospital Ethics Committee (approval number: 17.08.2017/18). Consent form was filled out by all participants.

Study Scales

Pediatric Quality of Life Inventory

The PedsQL was developed for children, and it is a widely used, straight forward, and generic QoL measure that can be implemented in a short time period (16). There are two different scale forms, a self-reported scale and a parent-reported scale. Each scale is modified according to the following age groups; 2-4, 5-7, 8-12, and 13-18 years-old and the modifications were designed by accounting for the characteristics of each age group. The scale consists of four subgroups that aim to question physical, emotional, social, and school related functions. The self-reported and parent-reported forms each consist of 23 items. The score of these items is linearly converted to a value between 0 and 100, and a higher number of points indicate a higher QoL. A Turkish validity and reliability study of the PedsQL has been conducted for adolescents (17).

Pittsburgh Sleep Quality Index

The PSQI is a self-reported scale consisting of 19 items that evaluate sleep quality and sleep disorders over the last month. Each component is scored between 0 and 3 points, and a total of 7 components (subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, daytime dysfunction) give the total score of the scale. A total point score of over 5 indicates "bad sleep quality" (18). The Turkish version of the PSQI was developed by Agargun et al. (19).

Epworth Sleepiness Scale

The ESS is an 8-item self-administered scale that is easy to use. It evaluates the general sleepiness of an individual in 8 different daily life situations. The ESS score ranges between 0 to 24 and a higher ESS score indicates greater daytime sleepiness (20). The ESS has a high sensitivity and a high specificity with a cut-off score of more than 10 indicating an abnormal level of daytime sleepiness (21). The Turkish validity and reliability study of the ESS was conducted by Izci et al. (22).

Statistical Analysis

The quantitative variables are expressed as the mean and standard deviation, while the categorical variables are expressed as numbers and percentages. The conformity

assessment of the normal distribution of the numerical data for a single sample was performed using the Shapiro-Wilk test. Bivariate comparisons were conducted with chi-square test (with Yates' and Fisher's corrections when needed), and for the independent groups, Student's t-test or Mann-Whitney U test was used depending on the distribution. Bivariate correlations were conducted with Pearson's or Spearman's correlation analyses depending on the normal distribution. All of the statistical tests were performed with the Statistical Package for the Social Sciences version 18.0 (SPSS, Inc., Chicago, IL, USA). A p value of less than 0.05 was considered as statistically significant.

Results

This study focused on 56 patients with chronic gastritis and 55 healthy volunteers. The age and gender distributions of the patient and control groups were similar (Table I). At the time of presentation to the hospital, 60.7% of the patients with gastritis presented with complaints of dyspepsia, 30.4% had abdominal pain, 30.4% had vomiting, 17.9% had nausea, and 10.7% presented with complaints of abdominal distention. Endoscopic assessment revealed that 34 patients (60.7%) had pangastritis and 22 patients (39.3%) had antral gastritis. There was no statistical difference between the complaints of those children who had pangastritis and those children who had antral gastritis according to the chi-square analysis ($p=0.758$, $z=6.548$). Also, three patients had bulbus ulcers and one patient had an antral ulcer. Similarly, no statistically significant difference was found between the complaints of adolescents with or without ulcer ($p=0.909$, $z=0.958$). The upper GIS

Table I. Socio-demographic data of the patients and controls			
	Patients	Controls	p value
Age (mean years \pm SD)	15.48 \pm 1.61	14.94 \pm 1.79	0.101
Gender			
Girls (n, %)	34 (60.7%)	28 (50.9%)	0.253
Boys (n, %)	22 (39.3%)	27 (49.1%)	
Body mass index percentile (mean \pm SD)	38.7 \pm 36.5	54.5 \pm 26.2	0.01
Economic condition			
Less income than expenditure (n, %)	24 (42.9%)	16 (29.1%)	0.74
Equivalent income and expenditure (n, %)	19 (33.9%)	16 (29.1%)	
More income than expenditure (n, %)	13 (23.2%)	23 (41.8%)	

SD: Standard deviation

endoscopy biopsy samples of the patients were evaluated histopathologically, and it was determined that 48 (85.7%) of the patients had non-atrophic pangastritis, 6 (10.7%) had antral predominant non-atrophic gastritis, and 2 (3.6%) had atrophic pangastritis.

It was determined that those patients with gastritis had lower scores than the healthy controls, which was statistically significant in all the QoL subscale scores and in the total scale score, with the exception of the social functioning total score (Table II). A comparison of the sleep quality of the gastritis patients with that of the healthy control group showed that there was a statistically significant difference between the two groups in all the subscale scores and the total scale score averages, except for subjective sleep quality (Table III). There was no statistically significant relationship between sleep quality and symptoms ($r=-0.069$, $p=0.612$). Moreover, the average sleepiness scale score of the gastritis patients was significantly higher than the average of the healthy controls (Table III). A comparison between the female and male patients suggested that there was not a statistically significant difference between the genders regarding their QoL, sleep quality, and sleepiness total scale scores ($p=0.27$, $p=0.07$, and $p=0.6$, respectively).

There was no significant difference between the patient and the control groups regarding their income and expenditure (Table I). Also, no statistically significant difference was found between the groups according to their economic conditions concerning the average of the life quality subscale and total scale scores and the sleepiness scale score. In the patient group, the sleep quality scale total score of those with lower incomes than expenditures was meaningfully higher when compared to

Table II. Assessment of the quality of life of the gastritis patients and the healthy controls

	Patients	Controls	p value*
Pediatric Quality of Life Inventory			
Physical health total score (mean ± SD)	74.1±15.65	94±4.97	<0.001
Emotional functioning total score (mean ± SD)	64.82±19.9	86.81±9.54	<0.001
Social functioning total score (mean ± SD)	90±12.48	90.81±7.97	0.715
School functioning total score (mean ± SD)	62.41±20.71	84.90±9.35	<0.001
Total score (mean ± SD)	72.34±15.51	87.43±6.43	<0.001

*Student's t-test was applied
SD: Standard deviation

those whose incomes were either equal to or higher than their expenditures ($p=0.024$); while there was no significant difference between the sleep quality of the control group and economic conditions ($p=0.958$). According to the Spearman correlation analysis, there was no correlation between sleep quality and socio-economic status ($r=-0.096$, $p=0.482$).

Eleven (19.6%) of the patients with gastritis were considered to be obese or overweight. Comparisons of these patients with the other gastritis patients showed that there was no statistically significant difference regarding the QoL, sleep quality total scale score, and sleepiness scale average score ($p=0.28$, $p=0.17$, and $p=0.63$, respectively).

H. pylori was detected in 25 (44.6%) of those patients who were confirmed to have gastritis via histopathology. The comparison of *H. pylori* positive patients with the *H. pylori* negative patients showed that there was no statistically significant difference between these two groups concerning the QoL and sleepiness scale total scores ($p=0.89$ and $p=0.38$, respectively). The assessment of the two groups concerning sleep quality showed that there was a statistically significant difference in the sleep duration subscale score ($p=0.029$), but not in the other subscales and total scale scores ($p=0.96$).

Table III. Assessment of the Pittsburgh Sleep Quality Index and Epworth Sleepiness scale results

	Patients	Controls	p value**
Pittsburgh Sleep Quality Index			
Subjective sleep quality (mean ± SD)	0.09±0.39	0.12±0.33	0.58
Sleep latency (mean ± SD)	2.43±1.89	0.46±0.64	<0.001
Sleep duration (mean ± SD)	0.50±0.68	0.05±0.23	0.013
Habitual sleep efficiency (mean ± SD)	0.85±0.77	0.56±0.71	0.04
Sleep disturbances (mean ± SD)	1.14±0.48	0.80±0.40	<0.001
Use of sleeping medication (mean ± SD)	0.69±1.04	0.07±0.26	<0.001
Daytime dysfunction (mean ± SD)	2.17±1.40	0.21±0.45	<0.001
Total score (mean ± SD)	7.7±3.14	2.5±1.5	<0.001
Epworth Sleepiness Scale			
Total score (daytime sleepiness) (mean ± SD)	4.01±2.34	2.81±1.18	0.001

**Student's t-test was applied
SD: Standard deviation

Discussion

Children with functional gastrointestinal disorders, such as functional abdominal pain, functional dyspepsia, and irritable bowel disease, have been reported to have significantly lower life quality than healthy controls (12). Several studies point out a deterioration in the QoL linked with chronic gastrointestinal diseases such as gastroesophageal reflux, constipation, and inflammatory bowel disease during childhood (12,13,23). It has also been reported that the low QoL of children with constipation improved after they received constipation treatment (24). In another study conducted on dyspeptic pediatric patients who had esophagitis or normal histological findings, after an average of 7.6 years of follow up, it was found that during their adolescence and young adulthood period, these patients had lower QoL scores, worse dyspeptic symptoms, and more functional insufficiency when compared to a control group (25). Nevertheless, there are no studies in the literature considering life and sleep qualities together in adolescents who have gastritis.

Studies conducted on adults with gastrointestinal diseases, such as peptic ulcers and gastroesophageal reflux, have reported lower life quality scores than the normal population, but also found significantly increased life quality scores after the treatment (26,27). A study on adults showed that patients with chronic gastritis had lower average scores when compared to those patients with peptic ulcers in all the life quality subscales, except for the physical functioning scale score (10). When compared with the normal population, both groups of patients had lower qualities of life scores (10). In our study, we examined the effects of gastritis on the life and sleep qualities of adolescents, and observed that those adolescents with gastritis had lower life qualities in all subscales, except for the social functioning scale score and the total score. A previous study from China that focused on adult patients with gastritis and peptic ulcers indicated that women with low-income levels had a lower QoL. The differences in the distribution of the women and men in both the patient groups were reported to affect these results (10). In our study, the QoL assessment of those patients with gastritis related to their gender and income level did not reveal a statistically significant difference.

Sleep is a fundamental and essential daily life activity that affects the life quality and health of human beings (28). Sleep quality can be affected by many factors, such as lifestyle, environmental factors, work, social life, economic

conditions, general health state, and stress (29,30). In our study, while sleep quality was poor in chronic gastritis patients whose expenditure was higher than their incomes, in the control group, income level had no adverse effect on sleep quality. However, the limitation of this study is that our patients were not assessed for negative factors such as a negative social environment or unhealthy living conditions (access to clean water and food, a non-hygienic living space or their nutrition characteristics). In our study, it is seen that the gastritis patients had worse sleep quality scores than the controls regarding all the subscale scores and the average of the total scale scores, except for the subjective sleep quality score. Subjective sleep quality is a component that is based on someone's interpretation of what they think about their sleep quality. The fact that our patients are not significantly different from the controls regarding subjective sleep quality may be related to their inability to interpret sleep qualities as poor or to be unaware of their sleep quality. Daytime sleepiness is an important clinical and public health problem that reduces the QoL significantly. In our study, we determined that the gastritis patients have significantly higher daytime sleepiness scale scores than the healthy controls. We think that various symptoms related to gastritis, such as abdominal pain, dyspepsia and vomiting affect the daily functioning of the individual and their daytime sleep pattern. However, in our study, when the sleep quality and the symptoms were examined, a statistically significant relationship was not found. In our study, the comparison between the male and female patients regarding their sleep quality and daytime sleepiness revealed that there was no statistically significant difference between the genders. Moreover, the detection of *H. pylori* in the gastritis patients did not have any effects on the QoL, daytime sleepiness, or general sleep quality, but the sleep duration was shorter when compared to the *H. pylori* negative patients.

A study conducted by Filik and Ozer (11) reported a significant relationship between gastritis or erosive esophagitis and short sleep duration in adults. This relationship was especially meaningfully higher in overweight or obese patients. It has been reported that a high BMI can lead to sleep disorders in adults and that obese patients may suffer from sleep disorders and sleeping difficulties (31,32). Moreover, childhood obesity may lead to many complications that can damage QoL, such as poor academic performance, psychological findings, lifelong obesity, and cardiovascular disease (33). In one study of 144 obese and overweight children, sleep quality scores assessed via the

PSQI and were found to be worse than those of healthy children (34). In our study, 19.6% of those patients with gastritis were obese or overweight, and their sleep qualities and qualities of life were not worse when compared to the rest of the gastritis patients in the study sample.

Conclusions

This study is important because it is the first to evaluate the QoL and sleep quality in adolescents with chronic gastritis. In our study, adolescents with chronic gastritis had poor sleep quality and lower QoL scores. The limitations of this study are the small sample size and the unevaluated negative factors such as negative social environment and unhealthy living conditions. In addition, we were not able to assess the sleep and QoL of our patients after receiving gastritis treatment. For this reason, we think that future studies evaluating chronic gastritis adolescents will be useful.

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Ethics

Ethics Committee Approval: The study was approved by the University of Health Sciences, Tepecik Training and Research Hospital Ethics Committee (approval number: 17.08.2017/18).

Informed Consent: Consent form was filled out by all participants.

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Authorship Contributions

Medical Practices: Y.Ç.A., G.Ö., M.K., Concept: Y.Ç.A., G.Ö., M.K., Design: Y.Ç.A., G.Ö., M.B., Data Collection or Processing: Y.Ç.A., G.Ö., M.K., Analysis or Interpretation: Y.Ç.A., G.Ö., M.B., Literature Search: Y.Ç.A., G.Ö., M.K., Writing: Y.Ç.A., G.Ö.

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