

Effect of Chronic Adenotonsillitis on Learning Achievement and Sleep Quality in Students of Sd Negeri 1 and Sd Negeri 5 Ubung, Denpasar

I Dewa Gede Arta Eka Putra¹, I Made Muliarta² and Richard P. Simbolon¹

¹Otorhinolaryngology-Head and Neck Department,
Medical Faculty of Udayana University/Sanglah General Hospital, Denpasar

²Physiology Department, Medical Faculty of Udayana University Denpasar.

*Corresponding author E-mail: aep.tht@gmail.com

<http://dx.doi.org/10.13005/bpj/1651>

(Received: 01 November 2018; accepted: 12 January 2019)

Chronic adenotonsillitis is a chronic inflammation of the adenoid and tonsils, which is characterized by tonsillar enlargement accompanied by dilated crypts with or without exudate. The most common cause of breathing disorders during sleep in children is adenoid hypertrophy or chronic adenotonsillitis. Breathing disorders during sleep in children will cause lack of concentration during learning which in turn affects the learning process and results. This research is an analytic observational study using cross-sectional design. Subjects in this study were 4th, 5th and 6th grade elementary school students as many as 324 consisting of 118 students with chronic adenotonsillitis and 206 controls. The samples done the Pediatric Daytime Sleepiness Scale (PDSS) questionnaire and collected student report card data for the last semester and the previous 1 year (2 semester). Based on the comparison of student report card in chronic adenotonsillitis patients, 1 year (2 semesters) before with the latest report card obtained a decrease with a difference of -0.8 which statistically significant with a significance value of $p=0.000$ ($p<0.05$). From the PDSS score of students with chronic adenotonsillitis, the results were 16.8 where this score was worse compared to control which was 10.8 which means that there is a statistically significant difference with value of $p=0.000$ ($p<0.05$). Based on the effect of chronic adenotonsillitis status on the difference in student report card, a pure influence was obtained by calculating the variables of age, sex and body mass index which is -2.007 while the increase in PDSS score was 5.903 which means that there is a statistically significant effect on the value $p=0,000$ ($p<0,05$). Chronic adenotonsillitis affects the decrease in learning achievement of elementary school student as seen from the decrease in report card and also affects the decrease in sleep quality seen from an increase in PDSS score.

Keywords: chronic adenotonsillitis, learning achievement, sleep quality.

Chronic adenotonsillitis is a chronic inflammation of the adenoids and tonsils which is characterized by tonsillar enlargement accompanied by enlarged crypts with or without exudates.¹ Risk factors for chronic adenotonsillitis include chronic irritation, exposure to cigarette smoke, poor oral

hygiene, poor nutrition or low body resistance and the influence of weather and inadequate treatment of acute tonsillitis.²

The diagnosis of chronic tonsillitis is made by anamnesis, physical examination and support. The anamnesis include the main complaint

of the patient during treatment, including recurrent sore throat, which does not disappear with adequate treatment. On physical examination there will be fever, adenoid face and enlargement of tonsil. According to Brodsky, the classification of tonsillar enlargement is based on the ratio of the tonsils to the oropharynx, measured between the anterior pillars of both sides. In adenoid hypertrophy, the examination that can be done is anterior rhinoscopy by looking at the movement of the molar palate which is retained during phonation (soft palate phenomenon).^{3,4} Management of chronic tonsillitis is divided into 2, conservative and operative. Conservative therapy is done to eliminate the cause of infection, and overcome complaints. If the tonsils are enlarged and causing airway obstruction, severe dysphagia, sleep disturbances, abscess formation, or no success with conventional treatment, tonsillectomy surgery needs to be performed.^{5,6}

Chronic adenotonsillitis other than causing local symptoms, can also cause systemic symptoms. The impact of chronic diseases on children is very large for the family and social environment. Children with chronic adenotonsillitis can be physiologically impaired and cause children not to go to school because of illness which in turn affects the learning process and results. Upper airway obstruction arising resulting in physiological and psychological disorders so that sleep quality decreases and affects learning achievement.⁷

METHOD

This study was an analytic longitudinal observational study with a retrospective cohort design. The study was conducted in 2 elementary schools, namely SD Negeri 1 and SD Negeri 5 Ubung, located in Ubung Village, North Denpasar Subdistrict, Denpasar City in August 2018. The sampling technique in this study was by cluster sampling where SD was chosen randomly in individual groups in a particular region population. The inclusion criteria of this study are: students of SD Negeri 1 and SD Negeri 5 Ubung in the academic year 2017-2018, get permission from their parents and are willing to complete the questionnaire, normal IQ scores (score 90 to 129) and have good nutritional status (BMI > 18.5).

While the exclusion criteria were: students or parents who refused to participate in the study, suffered from other chronic diseases such as chronic rhinitis, chronic otitis media, pulmonary tuberculosis, heart disease, kidney disease and anemia, as well as students who underwent tonsillectomy surgery. The data will be analyzed statistically using SPSS computer software.

The distribution of chronic adenotonsillitis from 324 study subjects are 118 students (36.4%), the rest 206 students (63.6%) did not suffer from chronic adenotonsillitis. The mean age is 10.6 years old with standard deviation of 0.9 years. Based on the age, the youngest is 9 years old while the oldest is 13 years old. The most students with chronic adenotonsillitis are male as many as 63 (53.4%), and female as many as 55 students (46.6%). From 118 students with chronic adenotonsillitis, 55 students (17%) with T3 on the right tonsil, while 54 students (16.7%) with T3 enlargement of left tonsil.

From the results of the t-independent test, the average score of student report cards that suffered from chronic adenotonsillitis 1 year (2 semesters) previously was 79.0 ± 5.5 while that was not 78.3 ± 4.9 with a mean difference of 0.7. In the average student report card last grade who suffered from chronic adenotonsillitis was 78.2 ± 5.4 while the non-score was 79.5 ± 4.6 with a mean difference of -1.3, meaning that the mean value was higher for students who did not suffer from chronic adenotonsillitis. Based on these statistical tests, there are significant differences in report cards with a significance value of $p = 0.025$ ($p < 0.05$). The difference in report card grades for students who suffer from chronic adenotonsillitis is -0.8 ± 2.7 , which means there is a decrease in report card grades, while for students who do not suffer is 1.2 ± 2.7 , which means there is an increase in report cards. Based on the results of the difference in value, there is a statistically significant difference in the value of report cards with a significance value of $p = 0,000$ ($p < 0.05$).

From the results above, the mean PDSS score of students who suffer from chronic adenotonsillitis is 16.8 with a standard deviation of 2.8 while the control group 10.8 with a standard deviation of 4.5. A high PDSS score in students suffering from chronic adenotonsillitis shows

decreased sleep quality. The mean difference in scores between students who suffer from chronic adenotonsillitis and control is 6.0. Based on these scores, there are statistically significant differences in PDSS scores with a significance value of $p = 0.000$ ($p < 0.05$).

From the Ancova test results obtained the pure effect of chronic adenotonsillitis on the decreased in report card grades as much as -2.007, taking into account the control variables of age, sex and body mass index (nutritional status). Based on these results, there is a statistically significant effect of chronic adenotonsillitis on a significant decrease in student grades with $p = 0.000$ ($p < 0.05$).

Based on the Ancova test results obtained the pure effect of chronic adenotonsillitis on the increase in PDSS score as many as 5.903, taking into account the control variables of age, sex and body mass index (nutritional status). Statistically, there is a significant effect of chronic adenotonsillitis on sleep quality reduction as seen from a significant increase in PDSS score with $p = 0.000$ ($p < 0.05$).

DISCUSSION

According to study by Farokah *et al.* (2007) of 301 elementary school students in the city of Semarang, obtained 145 students (48.2%) suffering from chronic adenotonsillitis. While study by Rahman *et al.* (2015) mentions as many as 35 of 230 students at SD Negeri 1 Karangasem Surakarta diagnosed with chronic adenotonsillitis.^{8,9} This is not much different from this study where 118 students (36.4%) were suffering from chronic adenotonsillitis, while 206 other students did not (63.6%).

Based on this study, the mean age of patients with chronic adenotonsillitis is 10.6 years old with the youngest age being 9 years old and the oldest is 13 years old. Research conducted by Fakh *et al.* (2016) at RSUP Dr. M. Djamil Padang in 2013 found patients with chronic tonsillitis in the 10-14 years age group (50%).¹⁰ Ramya *et al.* (2016) reported their study on children undergoing adenotonsillectomy, the majority (65%) aged 5-10 years old, while Muhardjo (2009) reported the majority of children who underwent adenotonsillectomy under 15 years of age.^{11,12} Sakka *et al.* (2011) reported the incidence

of chronic adenotonsillitis found in children aged 5-14 years.¹³ Many factors that cause chronic tonsillitis are more common in that age group. The greatest immunologic activity of tonsils is found at 3-10 years of age. The cellular immune response in chronic tonsillitis shows an increase antigen deposit in tonsil tissue. This causes an increase in regulation of immunocompetent cells that occur continuously.¹⁰

The most common chronic adenotonsillitis patients in this study were men, as many as 63 students (53.4%), while women were 55 students (46.6%) with a ratio of men and women to 1.1 compared to 1. There were no relationship between gender and the incidence of chronic adenotonsillitis as stated in various literatures. Ramya *et al.* (2016) reported in their study that almost 60% of the subjects were male.¹¹ Wong *et al.* (2007) in his 10-year study, from 329 children who underwent surgery there were 209 male and 120 female. Gupta *et al.* (2013) reported that the ratio of men and women in their study was 1.2 to 1.¹⁴ Based on several studies, it was concluded that there was no involvement of sex factors with chronic adenotonsillitis.¹⁵

Based on the degree of tonsillar enlargement, of the 118 students with chronic adenotonsillitis, the highest were T3, 55 (17%) in the right tonsil and 54 (16.7%) in the left tonsil. This is consistent with study by Fakh *et al.* (2016) where patients with T3 tonsil size were the most widely performed adenotonsillectomy at RSUP dr. M. Djamil Padang in 2013.¹⁰ While research conducted by Shafaat (2011) concluded that tonsil size that is often found in children who undergo tonsillectomy from the most to the least is T3, T2 and T4.¹⁶

Based on the comparison of student report card grades of chronic adenotonsillitis patients in previous 1 year (2 semesters) with the latest report card obtained a decrease in which the previous report card score is 79.0 with a standard deviation of 5.5 and the last report card is 78.2 with a standard deviation of 5.4. Whereas for students who did not suffer from chronic adenotonsillitis there was an increase where the average previous report card was 78.3 with a standard deviation of 4.9 and the final report card was 79.5 with a standard deviation of 4.6. The difference in report card grades for students who suffer from chronic adenotonsillitis

is -0.8 which means there is a decrease in report card grades, while for students who do not suffer is 1.2 which means there is an increase in report card grades. From the difference in value, there are statistically significant differences with a significance value of $p = 0,000$ ($p < 0.05$). These results indicate that in patients with chronic adenotonsillitis there is a significant decrease in report card compared to students who do not suffer from chronic adenotonsillitis.

Table 1. The characteristic of study subjects based on chronic adenotonsillitis status, age, gender, and tonsil enlargements

Characteristics	n = 324
Chronic adenotonsillitis	
Yes	118 (36.4%)
No	206 (63.6%)
Age (years)	
Mean ± SD	10.6 ± 0.9
Minimal – Maximal	9 – 13
Gender	
Chronic Adenotonsillitis	118
Male	63 (53.4%)
Female	55 (46.6%)
Control	206
Male	125 (60.7%)
Female	81 (39.3%)
Right tonsil enlargement	
T1	206 (63.6%)
T2	47 (14.5%)
T3	55 (17%)
T4	16 (4.9%)
Left tonsil enlargement	
T1	206 (63.6%)
T2	49 (15.1%)
T3	54 (16.7%)
T4	15 (4.6%)

Table 2. The comparison of student report card grades before, after, the difference of grade in chronic adenotonsillitis group and control group

Variable	Group CAT (n = 118) mean ± SD	Control (n = 206) mean ± SD	Mean differences	95% Confidence Interval	P value
Before	79.0 ± 5.5	78.3 ± 4.9	0.7	(-0.4) – 1.9	0.212
After	78.2 ± 5.4	79.5 ± 4.6	-1.3	(-2.5) – (-0.1)	0.025
Grade difference	-0.8 ± 2.7	1.2 ± 2.7	-2	(-2.6) – (-1.4)	0

According to research by Farokah *et al.* (2007) in elementary school students in the city of Semarang found the average class of students with chronic tonsillitis was 76.6%, while those who did not suffer was 23.4%, with a significance value of $p < 0.001$ this result showed a significant difference, where there was a decrease grades in Student report cards in patients with chronic tonsillitis.⁸ This decline indicates that student learning achievement in patients with chronic adenotonsilis is the impact of chronic illness. This is in accordance with internal factors who play an important role in determining learning achievement because of the changes in physiological and psychological conditions. Individuals who are fresh physically and in a good psychological state will have different learning processes from those who are not.^{17,18}

PDSS is a simple questionnaire conducted on children in measuring daytime drowsiness which is a symptom of breathing disorders during sleep. PDSS can be done in school-age children. The range of scores are between 0-32, the PDSS results are useful as an indication of the severity of complaints due to breathing problems during sleep. PDSS score e” 15 means there is a decrease in sleep quality in students.¹⁹

In this study, the mean PDSS score of students with chronic adenotonsillitis is 16.8 which means there is a decrease in sleep quality. Based on study by Drake *et al.* (2003) on 450 students aged 11-15 years old, mean PDSS score are 15.3 with a standard deviation of 6.2.²⁰ These results indicate the effect of chronic adenotonsillitis on decreased sleep quality as seen from the increase in student PDSS scores. Tonsils and adenoid hypertrophy cause airway obstruction during sleep with hypoventilation of alveoli and hypoxia

at night which affects the physiological and psychological state. Symptoms are drowsiness during the day, reduced attention, reduced weight, decreased intellectual function and reduced learning achievement.²¹

In this study obtained the pure effect of chronic adenotonsillitis on the decreased in report card grades as much as -2.007. Based on these results, there is a statistically significant effect of chronic adenotonsillitis on a significant decrease in student grades with $p = 0.000$ ($p < 0.05$). Study by Rahman *et al.* (2015) out of 35 students who suffered from chronic tonsillitis, as many as 15 students whose achievement are decreased, with a significance value of $p = 0.019$ ($p < 0.05$) which means that there is a statistically significant relationship of chronic tonsillitis with student learning achievement seen from a decrease in value. Different result from Kargoshaie *et al.* (2009) where the relationship between tonsil size and decreased learning achievement was only

found in fourth grade elementary school students, this is not significant because of small sample.²² Decreased learning achievement in students with chronic adenotonsillitis could be an impact of chronic illness, besides intelligence, especially in children. A student suffering from chronic disease will find it difficult to get progress in the learning process because of the changes in physiological and psychological conditions. Physiological factors include gender, age, nutritional or food adequacy, body health conditions and sensory functions. While psychological factors that influence learning achievement include attention/concentration, observation, response, memory, feelings and motivation. Symptoms due to physiological conditions of students with chronic adenotonsillitis are obstacles to learning. If the symptoms increasingly interfere with physiological conditions, it is likely that students who suffer from chronic adenotonsillitis cannot learn at all.^{17,23}

Table 3. Comparison of PDSS score between chronic adenotonsillitis and control group

Variable	Group		Mean differences	95% Confidence Interval	P value
	CAT (n = 118) mean \pm SD	Control (n = 206) mean \pm SD			
PDSS score	16.8 \pm 2.8	10.8 \pm 4.5	6	5.1 – 6.8	0

Table 4. The influence of chronic adenotonsillitis on decreased of students grades

Variable	B	95% Confidence Interval	P value
Adenotonsillitis status	-2.007	(-2.624) – (-1.389)	0
Age	-0.112	(-0.408) – 0.185	0.459
Gender	0.523	(-0.077) – 1.123	0.087
Body Mass Index	-0.079	(-0.194) – 0.036	0.178

Table 5. Effect of chronic adenotonsillitis on increased PDSS score

Variabel	B	95% Confidence Interval	nilai p
Status adenotonsillitis kronik	5,903	4,981 – 6,826	0,000
Umur	0,097	(-0,346) – 0,540	0,668
Jenis kelamin	0,197	(-0,700) – 1,095	0,665
Indeks massa tubuh	0,055	(-0,117) – 0,227	0,527

From the pure influence of chronic adenotonsillitis on increasing PDSS scores, the results were 5.903, which means that there is a statistically significant effect with a value of $p = 0.000$ ($p < 0.05$). These results indicate an effect due to the occurrence of chronic adenotonsillitis to decrease sleep quality.

From existing research and clinical records, children with breathing disorders during sleep have a serious impact on their quality of life. Children with nasal obstruction due to adenoid hypertrophy can show some degree of hypoxemia. This nasal obstruction would trigger recurrent infections in the upper and lower respiratory tract, this is an important factor in the development of cardiopulmonary syndrome. Therefore, the consequences of breathing disorders during sleep due to chronic adenotonsillitis will cause a lack of concentration of the child while studying.⁷

Decrease in the concentration of learning will cause symptoms of drowsiness during the day, enuresis, aggressive weight loss and growth, decreased intellectual function which ultimately affects the decline in learning achievement.

CONCLUSION

Chronic adenotonsillitis has an effect on the decline in elementary school report card grades where the difference in value of previous 1 year (2 semesters) with the last report card has a statistically significant decrease, whereas for students who do not suffer from chronic adenotonsillitis have increased report card grades. Chronic adenotonsillitis also affects the decrease in sleep quality of students seen from the increase in PDSS scores compared to students who did not suffer from chronic adenotonsillitis.

REFERENCES

1. Novialdi N dan Pulungan MR. Mikrobiologi tonsilitis kronik. [Review artikel]. Padang: Fakultas Kedokteran Universitas Andalas: Padang. (2010).
2. Kumar DS, Valenzuela D, Kozak FK, Ludemann JP, Moxham JP, Lea J, et al. The reliability of clinical tonsil size grading in children. *JAMA Otolaryngology – Head & Neck Surgery*. **140**(11):1034-7 (2014).
3. Feres MFN, Hermann JS, Sallum AC and Pignatari SSN. Radiographic adenoid evaluation – suggestion of referral parameters. *Journal de Pediatria*.; **90**(3):279-85 (2014).
4. Wayne JB, Dan K, Webb CK and Giultoni K. *Select Health of South Carolina: Clinical Guideline Tonsillectomy and/or Adenoidectomy*. South Carolina; p. 1-17 (2014).
5. Jackson C and Jackson CL. *Disease of the Nose, Throat and Ear*. 2nd edition. WB Saunders Co; p. 239-57 (2008).
6. Stelter K. Tonsillitis and sore throat in children. *GMS Current Topics in Otorhinolaryngology – Head and Neck Surgery*.; **13**:1-24 (2014).
7. Fensterseifer GS, Carpes C, Weckx LLM and Martha VF. Mouth breathing in children with learning disorders. *Brazilian Journal of Otorhinolaryngology*.; **79**(5):620-4 (2013).
8. Farokah Suprihati and Suyitno S. Hubungan tonsilitis kronik dengan prestasi belajar pada siswa kelas II Sekolah Dasar di kota Semarang. *Cermin Dunia Kedokteran*.; **155**:87-92 (2007).
9. Rahman F, Triastuti NJ and Dasuki MS. Perbedaan prestasi belajar antara siswa tonsilitis kronis dengan siswa tidak tonsilitis kronis. 2015. [accessed August 2018]. Downloaded from: <http://eprints.ums.ac.id/39481>
10. Fakh IM, Novialdi and Elmatris. Karakteristik pasien tonsilitis kronis pada anak di bagian THT-KL RSUP dr. M. Djamil Padang tahun 2013. *Jurnal Kesehatan Andalas*.; **5**(2):436-42 (2016).
11. Ramya B, Viswanatha B, Siddappa M and Mohan A. Quality of life post adenotonsillectomy in children with adenotonsillar hypertrophy: a prospective study. *Research in Otolaryngology*.; **5**(2):32-8 (2016).
12. Muhardjo DHA. Pengaruh Adenotonsilektomi pada Anak Adenotonsilitis Kronis Obstruktif terhadap Imunitas. [Disertation]. Surakarta: Universitas Sebelas Maret. (2009).
13. Sakka I, Sedjawidada R, Kodrat L and Rahardjo SP. Kadar imunoglobulin A sekretori pada penderita tonsilitis kronik sebelum dan setelah tonsilektomi. *Jurnal Oto Rhino Laryngologica Indonesiana (ORLI)*.; **41**(3):1-5 (2011).
14. Gupta N, Vaid L and Singh PP. Impact of tonsillectomy on quality of life in children: our experience. *Indian Journal of Clinical Practice*.; **24**(6):543-6 (2013).
15. Abouzieid A, and Massoud E. Sex differences in tonsilitis. *Dalhousie Medical Journal*.; **35**(1):8-10 (2008).
16. Shafaat D. Correlation of tonsillectomy with palatine tonsil size. *Acta Medicina Iranica*.; **49**(5):305-6 (2011).
17. Suryabrata S. Psikologi Pendidikan. Edisi ke-5. Jakarta: Raja Grafindo. (2012).

18. Santrock JW. Psikologi Pendidikan. Edisi ke-5. Jakarta: Salemba Humanika. (2014).
19. Shahid A and Wilkinson K. Pediatric Daytime Sleepiness Scale (PDSS). In: Shahid A, Wilkinson K., editor. *STOP, THAT and One Hundred Other Sleep Scales*. 1st edition. Springer-Verlag New York. 2012. p. 253-4.
20. Drake C, Nickel C, Burduvali E, Roth T, Jefferson C and Badia P. The Pediatric Daytime Sleepiness Scale (PDSS): sleep habits and school outcomes in middle-school children. *Sleep.*; **26**(4):455-8 (2003).
21. Franco RA and Rosenfeld RM. Quality of life for children with obstructive sleep apnea. *Otolaryngology, head, and neck surgery.*; **123**: 9-16 (2008).
22. Kargoshaie AA, Najafi M, Akhlaghi M, Khazraie HR and Hekmatdoost A. The correlation between tonsil size and academic performance is not a direct one, but the result of various factors. *Acta Otorhinolaryngologica Italia*; **29**:255-8 (2009).
23. Smet B. Psikologi Kesehatan. Jakarta: Grasindo. 2008.