EVALUATION OF ANXIETY AND DEPRESSION USING HOSPITAL ANXIETY AND DEPRESSION SCALE IN PATIENTS WITH PRIMARY ANGLE CLOSURE GLAUCOMA

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DISCLAIMER

I hereby certify that the work in this dissertation is my own. I declare that I have no financial interest in the instruments used in this study.

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ABSTRACT

INTRODUCTION

Primary angle closure glaucoma (PACG) is the second most common primary glaucoma after primary open angle glaucoma (POAG). It is a chronic disease and requires life-long treatment. Chronicity of the disease often affects mental health of patients with glaucoma. However, prevention and detection of mental health issue in patients with PACG are often neglected. PACG is associated with high rate of anxiety and depression. To optimise patients' compliance and prognosis, every chronic illness, including PACG, should be managed holistically.

OBJECTIVE

The objectives of this study were to assess anxiety and depression using Malay version Hospital anxiety and depression scale (HADS) in PACG patients and to determine its association factors.

METHOD

A cross sectional study was conducted involving PACG patients from Hospital Universiti Sains Malaysia (HUSM), Hospital Raja Perempuan Zainab II (HRPZ II) and Hospital Kuala Krai from May 2020 till January 2022. A total of 150 patients were recruited. Ocular examination and Humphrey visual field (HVF) were performed. PACG severity was scored based on Advanced Glaucoma Intervention Study (AGIS) on the Humphrey visual field (HVF) of the worse eye. HADS was used to screen patients' symptoms of anxiety and depression. HADS is divided into screening for anxiety (HADS-A) and depression (HADS-D). If the score ≥ 9 is considered anxiety and depression based on respective questionnaire. The mean HADS score for anxiety (HADS-A) and depression (HADS-D) were determined. The associated factors of anxiety and depression were evaluated.

RESULTS

Out of 150 patients with PACG recruited in this study, 65.3% were female, 88.7% were Malay. The mean age of PACG was 65.3(8.8) years old. Percentage of PACG patients with anxiety and depression were 10% and 11.3% respectively. On multivariate analysis, a significant negative linear association was identified between age at recruitment with HADS-A (adjusted b=-0.20; 95% CI=-0.10, -0.02; p=0.004). There was positive linear association between number of acute angle closure (AAC) attack (adjusted b=0.17; 95% CI=0.09, 0.83; p=0.015) and severity of PACG (adjusted b=0.42, 95% CI=0.13, 0.25; P<0.001) with HADS-A. Multivariate analysis also showed positive linear association between number of AAC attack (adjusted b=0.17; 95% CI=0.11, 0.93; p=0.014) and severity of PACG (adjusted b=0.51; 95% CI=0.19, 0.33; p<0.001) with HADS-D.

CONCLUSION

The percentage of anxiety and depression in PACG patients were 10.0% and 11.3% respectively. Patients with PACG are susceptible to develop anxiety and depression especially among younger patients with multiple AAC attack and more severe visual field defect. A comprehensive approach to the management of PACG patients should include evaluation of their mental health status and early referral for mental health care, which may aid in optimising patients' care and disease outcome.

ABSTRAK

PENGENALAN

Glaukoma sudut tertutup primer (PACG) adalah glaukoma primer kedua paling biasa selepas glaukoma sudut terbuka primer (POAG). Ia adalah penyakit kronik dan memerlukan rawatan sepanjang hayat. Kesihatan mental sering kali terjejas dalam pesakit penyakit kronik. Tetapi pencegahan dan pengesanan kesihatan mental di kalangan pesakit PACG tempatan masih tidak mencukupi. Pengurusan penyakit kronik termasuk pesakit PACG seharusnya dengan pendekatan holistik untuk meningkatkan pematuhan pesakit dan prognosis penyakit.

OBJEKTIF

PACG dikaitkan dengan kadar kebimbangan dan kemurungan yang tinggi. Objektif utama kajian ini adalah untuk menilai kebimbangan dan kemurungan menggunakan soalan kaji selidik kebimbangan dan kemurungan hospital versi Bahasa Melayu (HADS) dalam pesakit PACG dan mengenalpasti faktor mempengaruhinya.

KAEDAH KAJIAN

Kajian keratan rentas telah dijalankan melibatkan pesakit PACG dari Hospital Universiti Sains Malaysia (HUSM), Hospital Raja Perempuan Zainab II (HRPZ II) dan Hospital Kuala Krai dari Mei 2020 hingga Januari 2022. Sejumlah 150 pesakit telah diambil. Pemeriksaan mata dan medan penglihatan Humphrey telah dijalankan. Tahap PACG ditentukan berdasarkan skor AGIS pada medan penglihatan Humphrey (HVF) pada mata yang lebih teruk. Kebimbangan dan kemurungan pesakit dinilai menggunakan skala HADS, skor rujukan ialah ≥9. Mean skor HADS kebimbangan (HADS-A) dan kemurungan (HADS-D) dicatatkan. Faktor-faktor yang mempengaruhi kebimbangan dan kemurungan telah ditentukan.

KEPUTUSAN

Daripada 150 pesakit, 65.3% adalah perempuan, 88.7% Melayu dan purata usia ialah 65.3(8.8) Peratusan pesakit PACG dengan kebimbangan dan kemurungan (skor HADS ≥9) adalah 10% dan 11.3% masing-masing. Dalam analisis multivariant, umur (b diselaraskan=-0.20; 95% CI=-0.10, -0.02; p=0.004) didapati berhubungan linear negative dengan HADS-A. Serangan sudut tertutup akut (b diselaraskan=0.17; 95% CI=0.09, 0.83; p=0.015) dan keterukkan tahap PACG (b diselaraskan=0.42, 95% CI=0.13, 0.25; P<0.001) didapati berhubungan linear positif dengan HADS-A. Serangan sudut tertutup akut (b diselaraskan=0.17; 95% CI=0.11, 0.93; p=0.014), Keterukkan tahap PACG (b diselaraskan=0.51; 95% CI=0.19, 0.33; p<0.001) didapati berhubungan linear dengan dengan HADS-D.

KESIMPULAN

Peratusan kebimbangan dan kemurungan dalam pesakit PACG adalah 10.0% dan 11.3% masing-masing. Pesakit PACG mudah terdedah kepada kebimbangan dan kemurungan, terutamanya pesakit usia yang lebih muda, bilangan serangan sudut tertutup akut dan medan penglihatan yang lebih teruk. Pendekatan komprehensif terhadap pengurusan pesakit PACG harus merangkumi penilaian menyeluruh terhadap kesihatan mental mereka dan rujukan awal untuk bantuan psikologi. Ini dapat membantu dalam mengoptimumkan penjagaan pesakit dan menambahbaik kesudahan penyakit.

CHAPTER 1

INTRODUCTION

1.1 NORMAL ANGLE STRUCTURE AND ANGLE CLOSURE

Anterior chamber angle is the most periphery structure of anterior chamber. It accommodates aqueous drainage system of the eye. (Alward and Longmuir, 2017; Kanski *et al*., 2011)

Angle closure referring to the occlusion of trabecular meshwork by periphery iris. It can be due to pupillary block, non-pupillary block, aqueous blockage anterior to iris, lens abnormalities and abnormalities posterior to lens. Pupillary block is the most common mechanism which occurs in primary angle closure glaucoma. When pupil is mid-dilated, lens-iris opposition is greatest. This results in blockage of aqueous flow from posterior chamber to anterior chamber at the pupillary margin. Aqueous flow obstruction causes a pressure difference between posterior and anterior chamber, resulting in iris bowing and iridotrabecular contact. This causes high intraocular pressure (IOP) and glaucoma. (Feldman and Tanna, 2019, Kanski *et al*., 2011)

1.2 PRIMARY ANGLE CLOSURE GLAUCOMA

Primary angle closure glaucoma (PACG) is described as iridotrabecular contact of 180 degree or more with glaucomatous optic neuropathy and visual field loss. (Jelinar *et al*., 2017; Kanski *et al*., 2011) Acute angle closure attack is acute presentation of symptomatic high IOP in angle closure. (Kanski *et al*., 2011; Prum et al., 2016; Shantha and David, 2017) PACG is the second most common primary glaucoma after primary open angle glaucoma. It is an important cause of blindness in Asia. PACG commonly occurs in female and old age group. (Chan et al. 2016) PACG can occur with or without acute angle closure attack. (Liza-Sharmini *et al*., 2014) The global prevalence of PACG is 0.5%, with Asia having the highest prevalence (1.09%). (Tham *et al*., 2014; Jelinar *et al.*, 2017) PACG is found in 0.64% of people in Southeast Asia. (Chan *et al*., 2016) PACG accounts for 67.5% of PACD patients in Malay population of Kelantan state, Malaysia. (Liza-Sharmini *et al*., 2014)

1.3 ANXIETY

Anxiety is defined as anticipation of future concern. It is a common stress response that alerts us in dangerous situations. It is associated with increase muscle tension, avoidance behaviour, fear (emotional response towards threat), fight and flight responses. (American Psychiatric Association, 2013) In anxiety disorder, those feelings are exaggerated, and it affects one's daily performance and personal relationships. There are several types of anxiety disorders which include: general anxiety disorder (GAD), panic disorder, specific phobia, agoraphobia, social anxiety disorder and separation anxiety disorder. (American Psychiatric Association, 2013) Anxiety disorder is strongly related to chronic diseases. (Clarke and Currie, 2009) A person suffering from GAD is known to be at risk of suicidal ideation and cardiovascular events. (DeMartini *et al.,* 2019) It can cause physical and psychological burden to patients and their family members.

1.4 DEPRESSION

Depression is a medical condition that has a negative impact on one's feelings. It causes sadness and loss of interest. Depression has an impact on one's daily life and personal relationships. (American Psychiatric Association, 2013) Depression symptoms include feeling of sadness or depress, loss of interest in previously enjoyed activities, changes in appetite, changes in sleeping behaviour, fatigue, purposeless physical activity, slow movement or speech, feelings of worthlessness or guilt, difficulty making decisions, difficulty thinking or concentrating, and suicidal ideation. (American Psychiatric Association, 2013) Both anxiety and depression are strongly related to chronic diseases. (Clarke and Currie, 2009) Major depressive disorder affects approximately 3.8 percent of the world's population. (Kessler and Bromet, 2013) Females have a higher percentage of depression than males. Other risk factors for depression include younger age group, divorced or separated. (Kessler and Bromet, 2013)

1.5 ANXIETY AND DEPRESSION IN CHRONIC DISEASE

The co-occurrence of anxiety and depression with chronic diseases is an important health concern. Anxiety and depression are the two most common forms of psychological disturbance that linked to chronic diseases. (Mabuchi *et al.*, 2008) A meta-analysis of several chronic diseases found that cardiovascular disease, stroke, diabetes mellitus, asthma, arthritis and osteoporosis were related to depression. Anxiety was more common in patients suffering from cardiovascular disease, stroke, arthritis and cancer. (Clarke and Currie, 2009) Local studies also found that chronic disease patients were associated with increase probability of depression and reduce quality of life. (Kaur *et al.*, 2013; Lim *et al.*, 2012) Depression can lead to patient non-compliance, which can worsen the illness. (DiMatteo *et al.*,2000) Various ocular diseases were also associated with anxiety and depression. According to Gerontoukou et. al., glaucoma patients experienced higher level of anxiety and depression. In the study, they found out that several associated factors were also linked to anxiety and depression. Higher levels of education, female gender, younger age group and heart disease were all associated with significant higher rate of anxiety. Unmarried patients, female and elderly had higher rate of depression. (Clarke and Currie, 2009; Gerontoukou *et al.*, 2015) In a meta-analysis in China, KH Wan et al reported that patients with dry eye syndrome had higher rate of depression. (KH Wan *et al.*, 2016) Study also showed that age macular degeneration patients were associated with higher depression and anxiety score compared to normal population. (Cimarolli, V.R. *et al.*, 2015)

Several studies also found that glaucoma patients had higher level of anxiety and depression. Most of previous researches were looking into anxiety and depression for general glaucoma

and POAG patients, and they had shown significant association of the disease towards anxiety and depression. Mabuchi et al. discovered a considerably higher prevalence of anxiety and depression among POAG patients compared to the general population in Japan. (Mabuchi *et al.* 2008) Anxiety was found to be 14% and depression was 57% among glaucoma patients in Turkey. (Tastan *et al*., 2010) According to Zhou et al., PACG patients had a high mean HADS-A score of 7.38(4.82) and a mean HADS-D score of 6.85(4.75). (Zhou *et al.*, 2013) Some studies showed significant higher proportion of anxiety and depression in PACG patients compared to POAG patients. (Kong XM *et al.*, 2014) On the other hand, few other studies showed no difference of anxiety and depression in both POAG and PACG groups. (Mabuchi F. *et al*., 2012; Lim NCS *et al.*, 2016; Zhou C *et al.*, 2013)

1.6 HOSPITAL ANXIETY AND DEPRESSION SCALE

Hospital Anxiety and Depression Scale (HADS) was developed by Zigmond and Snaith in 1983. This questionnaire is designed to self-evaluate anxiety and depression in people attending a non-psychiatric clinic. It consists of 14 item questionnaires, subdivided into 7 questions for anxiety (HADS-A) sub-scale and 7 questions for depression (HADS-D) sub-scale (appendix B). HADS scale had been used extensively worldwide, it is a cost effective tool in screening anxiety and depression. (Zigmond AS *et al*.,1983) The cut off point for original version HADS score is 10/11 for both subset of anxiety and depression. HADS score of 11 and above is considered having anxiety and depression.

HADS had been translated and validated into Malay version. (Yahya F et al, 2015; Lua, P.L. and Wong, S.Y., 2012) Scoring of 9 and above is consider having anxiety and depression. Based on this definition, the sensitivity is 90%, specificity is 86.2% and positive predictive

value of 94.6% for detection of anxiety. For depression, the sensitivity is 93.2%, specificity is 90.8% and positive predictive value of 97.5%. (Yahya F *et al*., 2015) Cronbach's α coefficient for both HADS-A and HADS-D were 0.82. (Lua, P.L. and Wong, S.Y., 2012)

1.7 RATIONALE OF STUDY

Glaucoma is the most common cause of irreversible blindness. After POAG, PACG is the second most frequent type of primary glaucoma. PACG follows a different path than POAG; there are numerous issues with PACG that might lead to psycho-emotional problems. In PACG, acute or recurrent attack, sudden blurring of vision, eye pain, undergoing laser periphery iridotomy can pose an increased risk of psychological stress to patients compared to the POAG group; hence, more research on anxiety and depression status in PACG patients is needed. Majority of studies done on anxiety and depression in glaucoma patients were conducted in East Asia and Singapore, which have different demographic characteristics than the local population. Demographic variations will have an impact on patients' emotional and psychological well-being. Therefore, it is important to learn more about the impact of difference in beliefs, religions, cultures and socioeconomic status of local population towards anxiety and depression in PACG patients.

This study helps us to improve our management of PACG patients via health psychological model that incorporates a biopsychosocial approach to glaucoma treatment. Improving the psychological aspects of PACG patients will improves their compliance and thereby reduce progression of disease. This will preserve patients' visual function and quality of life. Reducing disease progression will also reduce the necessity for glaucoma surgery in the future.

1.8 AMENDMENT

There were slight changes to the original proposal due to inability to recruit patients with PACS and PAC. There were only 20 patients with PACS and 17 patients with PAC, which made the analyses impossible. Thus, we decided to exclude these group of patients in this study. We then proceed to just analyse patients with PACG. The sample size for PACG was just adequate. Due to these unforeseen circumstances, we inadvertently have to change the objectives and title of this project to: Evaluation of Anxiety and Depression using Hospital Anxiety and Depression Scale in Patients with Primary Angle Closure Glaucoma.

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CHAPTER 2

OBJECTIVES

2.1 GENERAL OBJECTIVE

To evaluate anxiety and depression using validated Malay version Hospital Anxiety and Depression Scale (HADS) and its associated factors among patients with primary angle closure glaucoma (PACG).

2.2 SPECIFIC OBJECTIVES

1. To determine the prevalence of anxiety among patients with PACG using HADS score for anxiety (HADS-A).

2. To determine the prevalence of depression among patients with PACG using HADS score for depression (HADS-D).

3. To identify the associated factors of total anxiety score among patients with PACG.

4. To identify the associated factors of total depression score among patients with PACG.

CHAPTER 3

MANUSCRIPT

3.1 TITLE PAGE

Evaluation of Anxiety and Depression and Its Associated Factors Among Primary Angle Closure Glaucoma Patients in Kelantan, Malaysia

Running title: Mental-health in Primary Angle Closure Glaucoma

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3.2 ABSTRACT

Purpose

To assess anxiety and depression and its associated factors in primary angle closure glaucoma (PACG) patients in Kelantan, Malaysia.

Study Design

Cross sectional study

Method

A total of 150 PACG patients were recruited. PACG severity were evaluated using modified Advance Glaucoma Intervention Study (AGIS) score on the worse eye Humphrey visual field. The Malay version of Hospital anxiety and depression scale (HADS) was used to evaluate patients' anxiety and depression. Mean score and prevalence of anxiety (HADS-A) and depression (HADS-D) in patients with PACG were calculated and their associated factors were evaluated using multiple linear regression.

Results

Out of 150 PACG patients recruited, 65.3% were female, 88.7% were Malay. The mean age of PACG was 65.27(8.81). Prevalence of PACG patients with anxiety and depression (HADS score ≥9) were 10% and 11.3% respectively. On multivariate analysis, a significant negative linear association was identified between age at recruitment with HADS-A (b=-0.20; 95% CI=-0.10, -0.02; p=0.004). There was statistically significant positive linear association between number of acute angle closure (AAC) attack (b=0.17; 95% CI=0.09, 0.83; p=0.015) and severity of PACG (b=0.42, 95% CI=0.13, 0.25; P<0.001) with HADS-A. There was also statistically significant positive linear association between number of AAC attack (b=0.17; 95%

CI=0.11, 0.93; p=0.014) and severity of PACG (b=0.51; 95% CI=0.19, 0.33; p<0.001) with HADS-D.

Conclusion

Patients with PACG are susceptible to develop anxiety and depression especially among younger patients with multiple AAC and more severe visual field defect. Ophthalmologists are advised to detect the psychological impact among these patients to ensure better compliance of treatment.

3.3 KEYWORD

Anxiety, Depression, Hospital anxiety and depression scale, Primary angle closure glaucoma

3.4 INTRODUCTION

Primary angle closure glaucoma (PACG) is the second most common primary glaucoma after primary open angle glaucoma, it is an important cause of blindness in Asia. Asians and women are more likely to develop PACG due to shallow anterior chamber depth and shorter axial length [1]. Prevalence of PACG globally is 0.5% and it is higher in Asia (0.73%) [2]. PACG stand for 67.5% among primary angle closure disease patients in Malay population of Kelantan state, Malaysia [3].

The co-occurrence of anxiety and depression with chronic disease is an important health concern. Anxiety and depression are two most common psycho-emotional changes that developed as a result of chronic diseases [4]. In general, PACG as a chronic disease also has strong relation with anxiety and depression. Although limitation of activity due to visual loss manifests only in the late stage of PACG, the disease itself may have a significant impact on patients' mental health at any point along the disease due to various factors such as: fear of blindness, disease progression and fear of acute angle closure (AAC) attack [5]. Psycho-emotional aspect of PACG patients is important in managing the patients. Psycho-emotional issue may have an impact on patients' general well-being and adherence to treatment, which may further lead to disease progression.

Previous studies attempted to detect anxiety and depression among patients with POAG or glaucoma in general, and they found that glaucoma was significantly associated with anxiety and depression [4-7]. There were also comparison studies on anxiety and depression between patients with PACG and POAG, however the findings were inconclusive [5,7,8]. To the best

of our knowledge, there is no study on detection of anxiety and depression in patients with PACG in Malaysia.

Hospital Anxiety and Depression Scale (HADS) is one of the widely used, self-administered psychological screening tool [9]. HADS had been validated into Malay version that is suitable for use in our local population [10]. The aim of this study was to evaluate anxiety and depression in PACG using Malay version HADS, as well as to assess the associated factors of anxiety and depression among PACG patients in Kelantan state, Malaysia.

3.5 SUBJECTS AND METHODS

A cross-sectional study was conducted from May 2020 to January 2022. A total of 150 PACG patients were recruited from ophthalmology clinic of 3 centres in Kelantan, Malaysia: Hospital Universiti Sains Malaysia, Kelantan (USM), Hospital Raja Perempuan Zainab II (HRPZ II) and Hospital Kuala Krai. The study was conducted in accordance with the declaration of Helsinki for human research. The research ethics consent for this study was approved by the research ethics committee, School of Medical Sciences, USM [USM/JEPeM/20010030] and National Medical Research Register [NMRR-19-3760-51081].

Convenient sampling was used for recruitment of PACG patients during their follow-up in clinic. Informed consent was obtained from all participants before enrolment. PACG is defined as presence of PAC (presence of occludable drainage angle with evidence of peripheral anterior synechiae, elevated intraocular pressure, iris whorling, glaukomflecken, lens opacities or excessive pigment deposition on trabecular meshwork) with evidence of glaucomatous optic nerve damage [11]. Diagnosis of PACG was confirmed via ocular examination. Recruitment was strictly adhered to inclusion and exclusion criteria. Only PACG patients with 2 reliable Humphrey Visual Field (HVF) performed within 6 months from recruitment period were included in the study. In case of bilateral eye involvement, the eye with the more severe disease based on advanced glaucoma intervention study (AGIS) score was chosen. Patients with secondary angle closure glaucoma, underlying ocular diseases such as age-related macular degeneration (ARMD), maculopathies, retinopathies and other optic neuropathies, cornea scaring or dystrophies, cataract of more than grade 2 based on modified Lens Opacities classification system II, known case of anxiety, depression or other psychiatric disorders, patients without 2 reliable HVF within 6 months from recruitment period, patients on systemic beta blockers and those unable to interpret Bahasa Malaysia were excluded.

The severity of PACG was assessed using AGIS scoring system, score ranging from 0-20 [12]. Total deviation plot printout of HVF Swedish Interactive Threshold Algorithm Standard strategy (SITA-Standard) with 24-2 test pattern analysis was used. The scoring was individually conducted by principal investigator and a glaucoma consultant (AY). The AGIS scores were masked for both investigators. Mean score from both investigators were used to determine the severity of PACG. A reliable test (false positive and negative error <33%; and fixation loss <20%) with reproducible HVF within 6 months from the recruitment period were taken. For patients without 2 reliable HVF that were performed within 6 months from the recruitment period, repeated HVF were performed within a month. If repeated HVF were not reliable after 3 attempts, the patients were excluded from the study.

Subjects were required to complete the demographic data form and questionnaire based on self-administered Malay version HADS. Subjects were given 15 minutes to complete the questionnaire. The questionnaire was completed in a private room away from interruption of other people. For those who were unable to read due to poor vision, the interviewer read out the questionnaire, and the interviewer assisted with the documentation of answers for these patients.

The validated Malay version HADS was used to assess level of psychological distress: anxiety and depression [10]. It consists of 14 item questionnaires, with 7 questions for the anxiety sub-scale and 7 questions for the depression sub-scale. Each item is scored from 0-3, with a total score ranging from 0 to 21 for both subscales. The higher the subscale score indicated psychological distress. Anxiety is present when the score of HADS-A is equal or more than 9. If HADS-D scored 9 or more, the patient is considered to have depression.

The data was entered into Statistical Package for Social Sciences (SPSS) version 26.0 and checked to avoid double entry and missing data. For numerical data, they were documented as mean with standard deviation, while for categorical data were documented as frequency and percentage. The factors associated with HADS-A and HADS-D scores in PACG patients were studied using single and multiple linear regression. Factors that included into the analysis were age, family income, gender, living status, marital status, education level, with or without dependent, mode of transport to hospital, number of comorbidities, duration of PACG, number of antiglaucoma, number of ocular procedures, number of AAC attack, topical B-blocker use and severity of PACG. The assumptions of multiple linear regression were met for linearity, independent, normality of response variable and homoscedasticity. $P<0.05$ was deemed statistically significant.

3.6 RESULTS

3.6.1 Demographic data

Total of 150 patients were recruited. The prevalence of anxiety and depression were 10% and 11.3% respectively in patients with PACG. The demographic characteristic data of general PACG patients were documented in table 1 and its ocular characteristic in table 2. Table 1 showed that the mean age of PACG was 65.3(8.8). Most of the patients were female (65.3%) and of Malay ethnicity (88.7%). Majority of patients were living with family members (96%). The mean duration of PACG was 6.27(4.75) years (Table 2). Mean number of AAC attack was 1.21(1.01) with the mean AGIS score of 11.77 (5.97) (Table 2).

3.6.2 Factors affecting anxiety in patients with PACG

Based on table 3, by using simple linear regression, the significant factors associated with anxiety were younger age (crude b=-0.08; 95% CI -0.12, -0.03; p=0.002), self-driving to hospital (crude b=-1.07; 95% CI -1.92, -0.21; p=0.015), higher number of AAC attack (crude b=0.63; 95% CI 0.21, 1.05; p=0.003) and increase severity of PACG (crude b=0.21; 95% CI 0.15, 0.28, p<0001). In multiple linear regression, using backward entry, factors significantly associated with anxiety were found on younger age at recruitment, higher number of AAC attack, increase severity of PACG. There was significant negative relationship between age at recruitment and HADS-A score. A one-year increase of age was associated with lower HADS-A score by 0.20-point (adjusted b=-0.20, 95% CI -0.10, -0.02, p=0.004). There were significant positive relationships between number of AAC attack and PACG severity with HADS-A score. An increase of one AAC attack was associated with 0.17-point higher HADS-A score (adjusted b=0.17, 95% CI 0.09, 0.83, p=0.015). A one-point increase in AGIS score (PACG severity) was associated with increase of 0.42-point HADS-A score (adjusted b=0.42, 95% CI 0.13, 0.25, p<0.001).