STRUCTURAL EQUATION MODELING OF HEALTH BELIEF, INTENTION, HEALTH PROMOTING BEHAVIOUR, SOCIAL SUPPORT, SYMPTOM SEVERITY AND QUALITY OF LIFE AMONG PEOPLE WITH ABDOMINAL BLOATING IN KELANTAN

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by

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LIST OF ABBREVIATIONS

AB	Abdominal Bloating
AGFI	Adjusted Goodness Fit Indices
IFI	Incremental Fit Index
AVE	Average variance assume
BLQoL	Bloating Quality Of Life
BSQ	Bloating Severity Questionnaire
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
CI	Confidence Interval
CR	Composite reliability
EFA	Exploratory Factor Analysis
GFI	Goodness of Fit Indicess
GI	Gastointestinal
HB-Bloat	Health Belief for Bloating Scale
HPB-Bloat	Health Promoting Behaviour For Bloating Scale
HUSM	Hospital Universiti Sains Malaysia
JEPEM	Human Research Ethics Committee
MLR	Maximum Likelihood Robust estimates
MLM	Maximum Likelihood Mean Adjusted
MoH	Ministry of Health
NMRR	National Medical Research Registry
NNFI	Bentler-Bonett Non-normed Fit Indices
NFI	Bentler-Bonett Normed Fit Indices
PCFI	Parsimonous Comparative Fit Index

PGFI	Parsimonous Goodness Fit Indices
PNFI	Parsimonous Normed Fit Indices
PNFI2	Parsimonous Incremental Fit Index
QoL	Quality of Life
RMSEA	Root mean square Error of Approximation
SD	Standard Deviation
SEM	Structural Equation Modeling
SPSS	Statistical Product and Service Solutions
SRMR	Standardized Room Mean Square Residual
SS-Bloat	Social Support for Bloating Scale
TLI	Tucker Lewis Index
WLSMV	Weighted Least Square Matrix Variance

LIST OF SYMBOLS

δ	Difference between parameter
χ^2	Chi square
df	Degree of freedom
$\boldsymbol{N}$	Number of items
n	Frequency
$\boldsymbol{\lambda}$	Factor loading
$\boldsymbol{\Sigma}$	Summation of all values
e	Value of error
β	probability of Type II error/regression coefficient
p	Constant (for sample size calculation)
α	significance level/probability of a type I error
a	Constant (for regression formula)
p	p value

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STRUKTUR PERSAMAAN UNTUK KEPERCAYAAN KESIHATAN, NIAT, PERLAKUAN GALAKAN KESIHATAN, SOKONGAN SOSIAL, KETERUKAN SIMPTOM, DAN TAHAP KUALITI HIDUP DALAM KALANGAN ORANG YANG MENGALAMI KEMBUNG PERUT DI KELANTAN

ABSTRAK

Kembung perut (KP) dikatakan sebagai salah satu simptom yang kerap menggangu orang dari pelbagai latar belakang dan umur di seluruh dunia. Akan tetapi, ukuran impak sedia ada adalah amat terhad, terutamanya untuk mengkaji kesejahteraan psikologi KP dan perkaitannya dengan ukuran kesannya, seperti kesejahteraan psikologi, keterukan simptom dan tahap kualiti hidup. Kajian ini bertujuan untuk menghasilkan alat ukuran yang sah untuk kepercayaan kesihatan kembung, niat, perlakuan galakan kesihatan kembung, sokongan sosial kembung, gambarajah KP, soal selidik keterukan simptom dan kualiti hidup dan untuk melihat perkaitan diantara kepercayaan kesihatan, niat, perlakuan galakan kesihatan, sokongan sosial, keterukan simptom dan kualiti hidup dalam kalangan orang yang mengalami KP di Kelantan. Kajian ini merangkumi tiga fasa, Fasa I: Pembentukan soal-selidik dan terjemahan; Fasa II: Kajian penerokaan dengan mengesahkan soal-selidik melalui analisis penerokaan faktor; dan Fasa III: Kajian pengesahan melibatkan pengesahan model ukuran menggunakan analisis pengesahan faktor (APF) dan pembentukan model struktur. Kaedah persampelan bertujuan telah digunakan dalam usaha pengambilan peserta untuk Fasa II & Fasa III. Reka bentuk kajian secara keratan rentas telah digunakan dalam ketiga-tiga fasa. Dalam Fasa I, empat soal-selidik Melayu baru telah dibina melaui pencarian kajian lepas, cadangan

pakar, dan temuramah secara mendalam. Selain itu, soal selidik bahasa Inggeris seperti gambarajah KP, soal-selidik keterukan simptom dan kualiti hidup KP diterjemah kedalam bahasa melayu. Semua soal-selidik itu dikaji kesahan isi berdasarkan nasihat pakar dan pra-percubaan pada peserta. Dalam Fasa II, semua soal-selidik yang baru dibina dan diterjemah (kecuali niat kerana mempunyai satu soalan dan gambarajah KP) diuji untuk kesahan konstruk melalui kajian penerokaan dan keboleh percayaan oleh ketekalan dalaman berdasarkan alfa Cronbach telah dilapor. Dalam Fasa III, kesahan model ukuran yang diuji di Fasa II dipastikan dengan kajian pengesahan, yang mana seterusnya digunakan dalam analisis model struktur persamaan untuk meneliti perkaitan diantara pembolehubah yang dikaji. Skala Kegelisahan dan Kemurungan Hospital yang telah disahkan digunakan untuk mengukur kegelisahan dan kemurungan para peserta. Analisa statistik untuk Fasa II dan Fasa III telah dijalankan menggunakan SPSS 26 dan Mplus 8. Semua soal-soal selidik yang baru dibina dan diterjemah itu disahkan kandungannya berdasarkan pandangan tujuh pakar dan dicuba pada 30 peserta semasa proses pra-percubaan. Terdapat 152 peserta dengan min umur 31.27 tahun (sisihan piawai, SP=14.36) dan 323 peserta dengan min umur 27.69 tahun (SP=11.50) mengikuti kajian ini dalam Fasa II dan Fasa III. Dalam Fasa II kajian penerokaan, model akhirnya dibentuk dengan semua pemuatan faktor dan alfa Cronbach menunjukkan bukti kesahan dan kebolehpercayaan untuk soal-selidik yang diuji. Selepas itu, model akhir kajian pengesahan dengan indeks kepadanan berada dalam lingkungan yang diterima telah diperolehi dalam kajian pengesahan di Fasa III. Model ukuran akhir APF dimasukkan dalam model struktur, yang menerangkan kaitan antara pembolehubah kajian. Model struktur akhir menunjukkan kepadanan yang bagus berdasarkan beberapa indeks kepadanan dan 15 jalan yang bererti diperolehi. Model struktur

akhir menerangkan varians 16% untuk sokongan sosial, 39% bagi niat, dan 53.8% untuk kualiti hidup. Perkaitan yang bererti ditemui antara tahap keterukan awam terhadap kualiti hidup, sokongan sosial dan niat kearah tahap keterukan awam, kepercayaan kesihatan terhadap sokongan sosial, kemurungan dan kepercayaan kesihatan terhadap keterukan 24 jam, kepercayaan kesihatan tehadap niat dan perlakuan galakan kesihatan, niat dan keperluan galakan kesihatan kearah kemurungan dan niat terhadap perlakuan galakan kesihatan. Soal-selidik yang baru dibina dan diterjemah dikira sebagai sah dan dipercayai dalam mengukur kepercayaan kesihatan, niat, perlakuan galakan kesihatan, sokongan sosial, keterukan simptom dan kualiti hidup dalam kalangan orang yang mengalami KP. Model struktur menunjukkan terdapat beberapa perkaitan di antara pemboleh ubah dan terdapat faktor penyebab yang bererti yang memberi kesan kepada keterukan simptom dan kualiti hidup oleh orang yang mengalami KP. Kajian ini memberi informasi berguna kepada pengamal penjagaan kesihatan dalam mengurangkan keterukan dan meningkatkan kualiti hidup orang yang mengalami KP.

STRUCTURAL EQUATION MODELING OF HEALTH BELIEF, INTENTION, HEALTH PROMOTING BEHAVIOUR, SOCIAL SUPPORT, SYMPTOM SEVERITY AND QUALITY OF LIFE AMONG PEOPLE WITH ABDOMINAL BLOATING IN KELANTAN

ABSTRACT

Abdominal bloating (AB) is regarded as one of the common bothersome symptoms by people of diverse backgrounds and all ages worldwide. However, there were still limited validated measures to explore the psychological behaviour of people with AB and its relationship with the outcome measures, such as psychological well-being, symptom severity and quality of life (QoL). This research aimed to develop validated measures for Bloating Health Belief, Intention, Bloating Health Promoting Behaviour, Bloating Social Support, Pictogram AB, Bloating Severity Questionnaire, Bloating Quality of Life and to examine the relationship between health belief, intention, health promoting behaviour, social support, symptom severity and QoL among people with AB in Kelantan. The study consisted of three phases, Phase I: Questionnaires development and translation; Phase II: Exploratory study by validating questionnaires through the exploratory factor analysis (EFA); and Phase III: Confirmatory study consisting of the validity of the measurement model with confirmatory factor analysis (CFA) and structural equation modeling (SEM) model development. The purposive sampling method was used in recruiting the participants for Phase II and Phase III. A cross-sectional study design was employed in all three phases. In Phase I, four new Malay language questionnaires were developed through literature search, experts' input and in-depth interviews. Besides, the English version of the Pictogram AB, Bloating Severity

Questionnaire and Bloating Quality of Life were translated into Malay version. All of the questionnaires were examined for content validity based on experts' opinion and then pre-tested by the participants. In Phase II, all newly developed and translated questionnaires (except for intention as it consisted of one item and Pictogram AB) were tested for construct validity through exploratory factor analysis (EFA) and the reliability of internal consistency based on Cronbach alpha was reported. In Phase III, validity of the measurement models with CFA were confirmed for all the measures tested in Phase II, which were then used in a SEM analysis to determine the inter-relationships among the study variables. The validated Hospital Anxiety and Depression Scale was used to measure the anxiety and depression of the participants. Statistical analysis for Phase II and Phase III were performed by using SPSS 26 and Mplus 8, respectively. The newly developed and translated questionnaires were content validated based on seven experts' opinion and were comprehended by 30 participants during the pre-testing process. There were 152 participants with a mean age of 31.27 years old (standard deviation, (SD) = 14.36) and 323 participants with a mean age of 27.69 years old (SD = 11.50) participated in Phase II and Phase III studies. In Phase II of the exploratory study, the final models were established with all factor loading and Cronbach alpha showing evidence of validity and reliability for the questionnaires tested. Next, final measurement models of CFA with acceptable fit indices were obtained in Phase III of the confirmatory analysis. The final CFA measurement models were included in the SEM model, which explained the connections between the study variables. The final SEM model indicated good fit based on several fit indices and 15 significant path relationships were established. The final SEM model explained the variance of the social support by 16%, intention by 39%, and QoL by 53.8%. Significant relationships were found between severity

general towards QoL, social support and intention towards severity general, health belief towards social support, depression and health belief towards severity 24 hours, health belief towards intention and health promoting behaviour, intention and health promoting behaviour towards depression and intention towards health promoting behaviour. The newly developed and translated questionnaires were considered to be valid and reliable in the assessment of health belief, intention, health promoting behaviour, social support, symptom severity and QoL among people with AB in Kelantan. The SEM model indicated that there were some inter-relationships between the study variables and there were significant contributing factors influencing the symptom severity and QoL of people with AB. The present study provides valuable insight to the health care providers in reducing the symptom severity and improving QoL among people with AB.

CHAPTER 1

INTRODUCTION

This chapter intended to introduce the research information related to the present study before the detailed elaborations were proceeded in other chapters. The information in this chapter included background of the study, problem statement, rationale and significance of the study, research question, hypothesis, objectives, assumption, organization of the thesis and chapter summary.

1.1 Overview of the study

Abdominal bloating (AB) is one of the common symptoms that can happen anywhere, anytime and to anyone in the world. Azpiroz et al. (2007) defined abdominal bloating and distension as the subjective sensation feeling and increase in abdominal girth respectively. Asian people usually used the term "a lot of gases" to illustrate them (Seo et al., 2013). In Malaysia, term like "angin", "kembung" (bloated), "perut besar dari biasa" (stomach bigger than usual), and "sengkak" (tightness) were used. The variation in the two symptom pattern were commonly overlapped, thus distinguishing the symptoms could be hard by most of the people. The diagnostic criteria for AB listed in ROME Gastroenterology Associates (ROME) IV criteria (Schumulson & Drossman, 2017) from the books entitled ROME IV Diagnostic Algorithms for functional AB as one of the common gastrointestinal (GI) symptoms include, recurrent feeling of AB or visible distention for at least one days per week, onset of symptoms at least six months prior to diagnosis, the presence of symptoms for at least three months and insufficient criteria to establish other

diagnosis and may also co-exist with mild abdominal pain and minor bowel disorders (Schumulson & Drossman, 2017).

1.1.1 Prevalence of abdominal bloating

Several studies on IBS in countries such as the United States and Canada, indicated that the prevalence of AB ranged from 66% to 90% among IBS patient with higher prevalence from Irritable Bowel Syndrome with constipation (IBS-C) group compared to Irritable Bowel Syndrome with diarrhea (IBS-D), 15% to 30% for general population and female had higher rates of AB than male (Drossman et al., 1993, 2009; Heitkemper et al., 2004; Lembo et al., 1999; Ringel et al., 2009; Sandler et al., 2000). In Asian population, it was reported that the prevalence rate can vary from to 15% to 23 %. A five year follows up study by Kindt (2009) found modest correlation between AB and functional dyspepsia. Functional dyspepsia was common and long-lasting, where it shows recurring symptoms of indigestion without obvious cause.

The overall prevalence for age and sex-adjusted study was 19.0% for AB and 8.9% for visible distension. A study in Singapore by Ho et al. (1998) found that from the ethnic-adjusted prevalence, there were no ethnic differences in the prevalence of any of these symptom categories (chronic abdominal pain, frequent dyspepsia, irritable bowel syndrome, chronic constipation, chronic diarrhea) except for reflux-type symptoms, which were more common among Indians (7.5%) than Chinese (0.8%) or Malays (3.0%). Thus, AB which is common in IBS is also treated as the same and shows no difference in the prevalence rate.

1.1.2 The cases of AB in Malaysian adult population

There were 75% of AB patients without IBS regardless of gender or other underlying causes rated their symptoms as moderate to severe and more than 50 % agreed that their daily life activities were affected negatively. AB was one of the contributing factors which triggered the severity of IBS as reported by Drossman et al. (2009) along with abdominal pain, bowel difficulties and diet restrictions even though IBS's concept of severity is complex and multi-determined. Drossman et al. (2009) reported that there were evidences of impaired health status either through dietary restrictions, , poor quality of life (QoL), limitationof daily activities, work absenteeism, high health care utilization, and mood disturbance along with AB symptoms.

A study in Kuala Lumpur, Malaysia found that women have predominantly been reported with IBS symptom cases among young adult's population (Tan et al., 2003) . The prevalence rate of IBS in the present study was 15.8% respectively (Tan et al., 2003). Tan et al. (2003) reported that the self-reported symptoms of anxiety, depression, insomnia, headache , and backache were experienced by the subjects with IBS. However, only a small portion of them seek for alternative measure to heal the symptoms where 13.1% of the IBS group had consulted their health-care practitioners and 20.2% reported self-medication (Tan et al., 2003). Furthermore, symptoms supportive of the diagnosis of IBS were common among young Malaysians, with a prevalence rate of 15.8% which predominantly involved women (Tan et al., 2003).

1.1.3 Malaysian policy related to AB

The government adopted a balanced development approach that gives equal emphasis to both economic growth and the well-being of the people under the eleventh Malaysia plan. The loss of productivity in the workplace such as cases like absentism, and high cost of health care due to illness or symptoms like AB could impact the country's economy. To prevent the problem from happening, it is important to give more emphasis on the well-being and reducing the risk of productivity deflation among people who experienced AB. Therefore, it is important to further understand the issues on health belief, intention, health promoting behaviour, social support, severity and QoL among AB individuals.

As stated in Malaysia's strategic plan, the tenth Malaysian Plan, it was one of the government's efforts to enforce the well-being of the citizen through continuous attention on health care services, public safety, availability of affordable housing, social integration and sports growth. As AB was one of the symptoms which can trigger other problems and can affect individual's well-being under health care sector, it is important to explore the issues of AB. Thus, this study was in accordance to the plan for continuous inflation of health care growth in Malaysia through the discovery of new health research's area. Moreover, the evidence of 25.4 score increments of "Indeks Kesejahteraan Rakyat Malaysia" (IRKM) from 2012 to 2020 with non-stop workforce of government could be a stepping stone for further improvement in health care management.

1.1.4 Scope of the study

The study focused on selected demographic variables, psychological variables which includes TPB-applied-variables and social support, psychological variables based on depression and anxiety towards outcomes of symptom severity and QoL among people with AB in Hospital Universiti Sains Malaysia (HUSM), Kota Bharu, Kelantan. The TPB-applied-variables includes health belief, intention and health promoting behaviour specifically for AB symptom.

Figure 1.1 shows the location of HUSM in Kelantan's map. It shows how the hospital located in the center of the satellite's city of Kubang Kerian and connected to other areas. The hospital was visited by people in and out of Kelantan state such as Pahang and Terengganu.

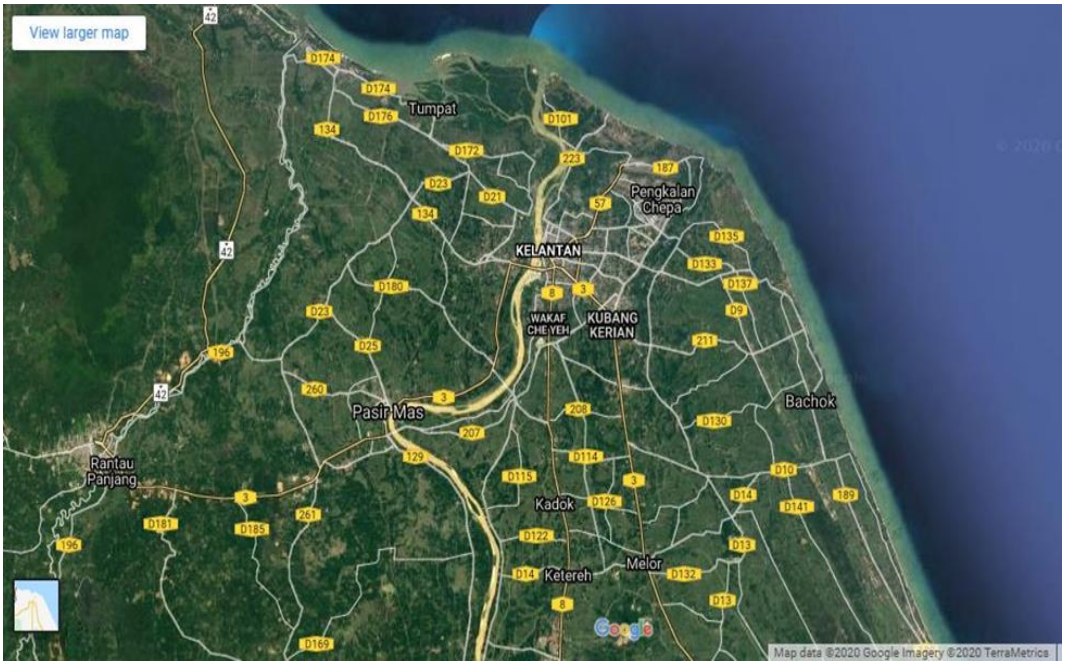

Figure 1.1 The map shows the distribution of districts that is connected to HUSM, which served as the referral center

1.2 Problem statement

AB is a common symptom that can affect both men and women of all ages. Excessive gas, frequent burping, and abdominal rumbling are some of the AB related symptoms that may be found in most patients (Thiwan, 2016). Intestinal gas production and transit, gut microflora and hypersensitivity of the patient's gut were suggested as the causes of symptom generations where the possible factors itself are still inconclusive yet as there are various complications to be explained (Seo et al., 2013). The majority of the patients with IBS have reported AB, and this was regarded as one of the most bothersome symptom (Abdullah et al., 2020). However, some manifestation was still inconclusive as diagnosis basically based on history taking. The present study examined the stability of the pictogram which later can be used as an alternative for diagnosis and may help to ease the clinician in work.

AB and abdominal distension (AD) are among the most common and bothersome symptoms to be noted, which have limited options of treatment and still needs a lot of explanations to be explore (Accarino et al., 2009). It can also happen to healthy people (Sullivan, 2012). By exploring the health belief, intention, health promoting behaviour and the association with depression and anxiety, it can give some ideas on the impact towards symptom severity and QoL especially among people with AB. Thus, it is important to examine the possible association between all of the related variables of interest in the present study.

There are no validated measures that assess the symptom severity, health beliefs, intention and behaviour among patients with AB. Psychological behavioral variables including health belief, intention and behavior are important for clinicians and researchers to improve their understanding of AB concerning psychological disturbances which could not be answered by a common medical examination. Therefore, it is crucial to develop an appropriate questionnaire in assessing the levels of health belief, intention and behaviour among people with AB.

1.2.1 Susceptibility of Malaysian adult to AB

Epidemiologic data had indicated that 15% to 30% of the general United States (US) population experienced AB symptoms (Caballero et al., 2020; Drossman et al., 2009; Palsson et al., 2020; Ringel et al., 2009). In Asians, the comparable prevalence rates were 15-23% (Ho et al., 1998). However, there is still a lack of data to determine the prevalence of AB among Malaysian population. Thus, it is important to identify the current numbers or cases of people with AB problem inunder studied community especially in Kelantan, Malaysia.

Several studies on IBS indicated that the prevalence of AB ranged for female and male were different as it may be related to hormonal balance effects in connection to menstrual cycle (Delgado-Aros et al., 2004; Drossman et al., 1993, 2009; Ringel et al., 2009; Seo et al., 2013). Seo et al. (2013) suggested that AB is second in chart as the most common reported symptom after abdominal pain for IBS. There are a few reports on GI symptoms such as AB and abdominal pain which were mostly experienced by obese people (Delgado-Aros et al., 2004; Seo et al., 2013). Malaysian as the Asia's fattest country based on National health & Morbidity Survey (NMHS) 2015 report should further research on the association of AB, socio demographic and related health issues.

1.2.2 AB among adult as an overlooked problem

IBS is a commonly presented gastrointestinal disorders where Western studies reported a prevalence of 10%-15% in range and most Asia community IBS prevalence based on various criteria are usually within the range of 1%-10%. Overall, the median value of Asia IBS prevalence ranged from 6.5% to10.1% where it is concluded that current Asia IBS prevalence is at least equal to the Western countries (Seo et al., 2013; Tan et al., 2003). One study discussed Asian country's reported low prevalence rates of IBS where Thailand (4.4%), Singapore (2.3%) and Hong Kong (96.6%), in comparison with Western population (Rajendra & Alahuddin, 2004).

The pathophysiology of AB is complicated and poorly understood by clinicians and researchers. Although no treatment is universally regarded as an

effective treatment for AB, several new interventions were developed during the past half decades (Ford et al., 2018; Lacy et al., 2011; Lacy et al., 2014). However, as it could affect the QoL of individuals, it has became a concern to be addressed by many clinicians and health care providers. Besides, more research is needed to understand the patient's health belief, intention and behaviour toward AB and the relationship with their QoL especially from patients' perspective.

1.2.3 Impact of AB to sufferers

AB did affect QoL as reported in a study by Thiwan (2016). Regardless of gender and underlying medical conditions, AB can cause significant distress to the patients. In AB patients who did not have IBS, the majority of the patients reported their symptoms as moderate to severe and it had reduced their daily activities to some degree due to AB (Sandler et al., 2000). Besides, AB has been found to be a significant predictor of IBS severity (Spiegel et al., 2009). Therefore, as the third out of 14 most important reasons to seek medical care, previous studies looked at different aspects of intervention in treating the symptoms (Annaházi et al., 2014; Choi et al., 2015; El-Salhy et al., 2020; Elsenbruch, 2011; Foley et al., 2014; Johannesson et al., 2015; Kim et al., 2003; Vejdani et al., 2006; Vulevic et al., 2018; Yoon et al., 2014) to find cure for AB (Khoshoo et al., 2006; Ringel et al., 2009).

Although AB is considered as a non-serious abdominal pain from the physician's perspective, it can affect the people's ability to work, participate in social or recreational activities and thus, affecting their QoL. A survey from the United States had reported that at least 65% patients with AB rates as moderate to severe for the symptoms and the complaints of decreased in physical activity due to AB increased up to 54%; where 43% of them took medication for AB or needed

medication (Seo et al., 2013). AB could be disturbing to the patients and also causes frustration to the physician because there is still lack of effective treatments recommended for the patients (Lacy et al., 2010).

In conclusion, AB and AD are common in the community and it might be an underlying marker for chronic diseases such as gastritis, stomach cancer and many more. Additional research on AB may help to further understand this symptom especially in different culture and region of population understudied. Moreover, this study aims to discover the patient response and belief from their own experiences regarding AB self-management and intention to treat AB.

1.2.4 Insufficient studies of AB among Malaysian adult

More and more research related to pathophysiology and possible treatments of AB were reported especially in Europe and widened up to Asia. However, there was still limited literature on AB in Malaysia. As AB was regarded as one of the common bothersome symptoms and it contributed to the degradation of QoL productivity, this symptom's occurrence cannot be neglected. Therefore, more research was needed to understand AB symptoms especially in Malaysian population for the development of better health care services in the future.

Based on the available literature, treatments using psychological approach were reported to be able to improve the symptoms and outcomes of functional gastrointestinal disorder patients (FGID; Palsson & Whitehead, 2013), which includes IBS, functional AB, functional constipation, and functional diarrhoea (International Foundation for Functional Gastrointestinal Disorders, 2016). Psychological factors such as stressful life, anxiety, and depression have been

identified to be associated with poor outcomes in FGID patients (Levy et al., 2006; Van Oudenhove et al., 2016). These psychological treatments would enhance the emotional well-being and reduce the needs of getting a health care attention (Palsson & Whitehead, 2013).

Various psychological behaviour theories are considered in the present study to examine the psychological issue and behaviour among patients with AB symptom and have been widely used in medical field (Kasper et al., 2012; Kueh et al., 2014). The psychological behaviour theory, Theory of Reasoned Action (TRA) concentrates on attitude, intention, behaviour relationship and the Theory of Planned Behaviour (TPB) incorporates the additional constructs which is perceived behavioural control (PBC; (Ajzen, 2012)). The TPB was be implemented in the study is based on the manipulation of three core aspects to increase the chance of action which is attitude, subjective norm and perceived behavioural control (Francis et al., 2004). These three core factors correspond to intention (Francis et al., 2004) and behaviour as the central core (Ajzen, 2011; Gibbons, 2006). Thus, TPB can help in enhancing the compliance with guideline where it used to be a designed strategy to help clinicians rule based on the guidelines and help people to maintain healthy behaviours (Francis et al., 2004).

In recent studies, more and more researches emerged which associate different factors towards QoL for example, anxiety or depression or stress (Devanarayana et al., 2011; Hertig et al., 2007; Mayer et al., 2001; Mönnikes et al., 2001), social support (Chan et al., 2020; Lai et al., 2020; Wang et al., 2014), and other related symptoms (Tan et al., 2003). Thus, it is important to explore this long list of factors as a possible causal factor towards degrading QoL among people with AB in Malaysia.

1.3 Rationale of the study

The issues of AB may not be prominently discussed among health practitioners. Even though it is merely a symptom, studies had proven that these may trigger other problems pertaining to the limited alternative of treatment for this issue. Realizing the importance of a healthy lifestyle which should begin earlier, therefore it is important to address the issues on health beliefs, intention and health behaviours related to improving AB among adults in Malaysia. Hence, targeting health education and health promotion in this setting is essential. It was reported that there was a number of factors including psychological factors which can affect the QoL among people with AB. Therefore, throughout the present research, it might proved the same result or vice versa.

AB is one of the common problems faced by many people in some point of their life. Although it is regarded as a non-critical illness, it may affect the productivity and well-being of an individual (Thiwan, 2016). Furthermore, there is still lack of study on AB among people in Malaysia. The psychological factors are also important variables to be considered in people with AB problem since it has been reported to influence the well-being of patients with the functional gastrointestinal disorder. Therefore, it is important to learn the psychological factors such as health belief, which can affect an individual's intention to treat and the behaviour towards intervention. In turn, how behaviour could impact the QoL among people with AB problem also needs to be addressed. This can be shown through the development of the structural model between the related variables later in the end of the present study.

Biopsychosocial which is focused in this study consists of three aspects, which are bio (symptoms, severity), psycho (depression and anxiety), and social (social support) with TPB-applied variables and QoL measure specifically for AB individuals. Psychological factors have become a major trigger and cause of AB symptom. AB has caused a discomfort and reduce the QoL of people who are facing this problem. Therefore, a special attention in alternative treatment and care should be implemented together with other medical treatments to improve the QoL of people with AB symptoms. This study would contributed to the knowledge of how the interrelationship of related variables affected by their psychological and behavioral traits and thus, increasing their QoL. This would indirectly improve the work productivity of people with AB and in general, it would bring a benefit to our economy.

Besides, the validated questionnaires were used to evaluate and understand the inter-relationship between the psychological variables among people with AB symptoms. It is important to examine the multiple pathways that lead to healthy behaviours which may provide the opportunity to test the significant relationship among the variables and lay as the important groundwork for the future health intervention study among adults to improve AB. Furthermore, the link between the related variables among AB population was not fully explored yet. Therefore, the present research was conducted to assess the interrelationship between variables related to AB as part of the health education and health promotion program among bigger population.

1.4 Significance of the study

AB is one of a common complaint by general population due to sedentary lifestyle. The psychology and QoL of people with symptoms related to abdomen should not be neglected. The study on the psychological attributes, behavior and QoL among people with AB are essential.

The present research provided a new insight on how health belief and health behaviours can act as an alternative for the promotion of health education among young adults. Health education was used to increase knowledge or awareness about risk factors for diseases or symptoms as indicated by Connell et al. (2008). Thus, this current study would add on to the literature about health behaviour patterns to empower adults in the decision-making process which in this case, is in the Malaysian context. Therefore, people with AB can used this information and tried different approach to improve AB. Moreover, this study examines the effect of the relationship between health belief towards health behaviours simultaneously based on a guided theory, which is unique, especially among adults who are at the age of risk. A thorough understanding of these pathways help to close the gaps of identifying various pathways in performing a healthy lifestyle practices among young adults.

Therefore, the present study aimed to examine the inter-relationship between health belief, intention, health promoting behaviour, social support, symptom severity, and psychological factors (depression, anxiety) towards QoL which could help to uncover the truth behind the floating hypothesis and as an information for future intervention research to provide better environment which can improve QoL and then elongate years of life.

The findings from the study could be used by people with AB to improve their symptoms in their daily life through application of TPB-related variables and other related variables presence in this study. Besides, the related information could be used by the Ministry of Health (MoH) for promoting health awareness to improve AB and related symptoms or diseases in the future. Overall, this study provides useful information in improving AB cases and would gradually lead us to a better health future.

1.5 Research question

Phase I:

1. How does the development of questionnaires assessing health belief (HB-Bloat), intention, health promoting behaviour (HPB-Bloat) and social support (SS-Bloat) among people with AB?

2. How are the Malay translated version questionnaires for assessing bloating severity (BSQ), quality of life (BLQoL) and bloating for pictogram (pictogram AB)?

3. Are the contents of the Malay version questionnaires (HB-Bloat, intention, HPB-Bloat, SS-Bloat, BSQ-M, BLQoL-M, pictogram) valid?

Phase II:

4. Are the Malay version questionnaires (HB-Bloat, HPB-Bloat, SS-Bloat, BSQ-M, BLQoL-M) structurally valid for assessing health belief, health promoting behaviour, social support, symptom severity,

and QoL among people with AB in Kelantan, Malaysiaby using exploratory factor analysis (EFA)?

5. Are the Malay version questionnaires (HB-Bloat, HPB-Bloat, SS-Bloat, BSQ-M, BLQoL-M) internally reliable to assess health belief, health promoting behaviour, social support, symptom severity, and QoL among people with AB in Kelantan, Malaysia?

6. Is the Malay version of pictogram AB stable at two time points among people with AB in Kelantan, Malaysia?

Phase III:

7. Are the Malay version questionnaires (HB-Bloat, HPB-Bloat, SS-Bloat, BSQ-M, BLQoL-M) valid for assessing health belief, health promoting behaviour, social support, symptom severity, and QoL among people with AB in Kelantan, Malaysia, by using confirmatory factor analysis (CFA)?

8. Are the Malay version questionnaires (HB-Bloat, HPB-Bloat, SS-Bloat, BSQ-M, BLQoL-M) reliable by using Raykov's construct reliability to assess health belief, health promoting behaviour, social support, symptom severity, and QoL among people with AB in Kelantan, Malaysia?

9. How does the structural equation model explains the inter-relationship between health belief, intention, health promoting behaviour, social support, symptom severity, depression, anxiety and QoL among people with AB in Kelantan, Malaysia?

1.6 Research objective

1.6.1 General objective

The general aim of the study is to examine the structural relationship of health belief, intention, health promoting behaviour, social support, symptom severity, depression, anxiety and QoL among people with AB.

1.6.2 Specific objectives

1.6.2(a) Phase I

1. To develop a Malay version questionnaire measuring the level of health belief, intention, health promoting behaviour, social support, symptom severity and QoL among people with AB.

2. To translate the BSQ, BLQoL and pictogram AB into Malay version.

3. To assess the content validity of HB-Bloat, intention, HPB-Bloat, SS-Bloat, BSQ-M, BLQoL-M and pictogram.

1.6.2(b) Phase II

4. To examine the validity of the Malay version of HB-Bloat, HPB-Bloat, SS-Bloat, BSQ-M, and BLQoL-M among people with AB in Kelantan, Malaysia by using EFA.

5. To examine the internal reliability of HB-Bloat, HPB-Bloat, SS-Bloat, BSQ, BSQ-M, and BLQoL-M among people with AB in Kelantan, Malaysia.

6. To examine the stability of the Malay version of pictogram AB across two time points among people with AB in Kelantan, Malaysia.

1.6.2(c) Phase III

7. To examine the validity of HB-Bloat, HPB-Bloat, SS-Bloat, BSQ-M, and BLQoL-M among people with AB in Kelantan, Malaysia by using CFA.

8. To examine the reliability of the CFA measurement models (HB-Bloat, HPB-Bloat, SS-Bloat, BSQ-M, and BLQoL-M) among people with AB in Kelantan, Malaysia by using Raykov's construct reliability.

9. To develop a structural equation model that explains the inter-relationship between health belief, intention, health promoting behaviour, social support, symptom severity, depression, anxiety and QoL among people with AB.

1.7 Research hypothesis

Phase 1:

Not applicable.

Phase II:

1. The Malay version questionnaires of HB-Bloat, HPB-Bloat, SS-Bloat, BSQ-M, and BLQoL-M are valid to be used among people with AB in Kelantan, Malaysia based on EFA.

2. The Malay version questionnaires of HB-Bloat, HPB-Bloat, SS-Bloat, BSQ-M, and BLQoL-M are reliable to be used among people with AB in Kelantan, Malaysia based on internal consistency.
3. The Malay version of pictogram of AB is stable across two time point among people with AB in Kelantan, Malaysia.

Phase III:

4. The Malay version questionnaire of HB-Bloat, HPB-Bloat, SS-Bloat, BSQ-M, and BLQoL-M are valid to be used among people with AB in Kelantan, Malaysia based on CFA.
5. The Malay version questionnaire of HB-Bloat, HPB-Bloat, SS-Bloat, BS BSQ-M, and BLQoL-M are reliable to be used among people with AB in Kelantan, Malaysia based on Raykov's construct reliability.
6. There are significant path relationships between health belief, intention, health promoting behaviour, social support, symptom severity, depression, anxiety and QoL among people with AB in Kelantan, Malaysia.

The sub-hypotheses within hypothesis 6 include:

a. Health belief is significantly related to intention.
b. Intention is significantly related to health promoting behaviour.
c. Perceived behavioural control (under health belief) is significantly related to health promoting behaviour.
d. Health promoting behaviour is significantly related to severity of AB.
e. Health promoting behaviour is significantly related to QoL.
f. Severity of AB is significantly related to QoL.
g. Social support is significantly related to severity of AB.

h Social support is significantly related to QoL.

i. Depression and anxiety are significantly related to severity of AB.

ji. Depression and anxiety are significantly related to QoL.

1.8 Assumptions

The assumption was made by the researchers prior to the start of the study. Based on the assumptions, proper research method was used in conducting the study.

1. Participants are representatives of patients who experience AB in Kelantan.

2. The measurement tools used in the present study were valid and reliable to be used based on literature (published evidence) and validity of new scales.

3. Participants who volunteer to join were honest with their answer towards the questionnaire.

1.9 Organization of the thesis

The thesis is organized into 10 chapters. Chapter 1 introduces the study and the content of this thesis. This includes the background of the study, problem statement, and research objectives. Chapter 2 is the literature review which provides information about previous studies pertaining to AB, prevalence, associated factors, and the impact of AB on the adult‘s QoL. The chapter ends with an illustration of a theoretical framework, explaining the research implementation and relationship of the variables that underlie in this study.

Then, Chapter 3 summarized the whole methodology used in the present study. Chapter 4 and Chapter 5 describe the research methods and results of Phase 1. Chapter 6 and Chapter 7 elaborate on the methods and results for Phase II. Meanwhile, Chapter 8 to Chapter 9 describes the research methods and results of Phase III. These chapters (chapter 4, 6 and 8) elaborate on the chosen approach and the study procedures such as sample size, data collection and data analysis for each phase. The results are described descriptively or inferentially which were then presented in tables or figures (in Chapter 5,7,9). Chapter 10 explains the discussion of findings based on the specific research objectives of this study. The last chapter of this study is Chapter 11. This chapter provides the conclusions and recommendations of the study to clinical practice and further research in the future.

1.10 Chapter summary

This chapter introduced important aspects related to this study. The chapter includes an introduction to AB, the background of the study and problem statement. This information had enlightened the direction of the study through the formulation of general and specific objectives. In addition, the rationale of the study was provided to emphasize the significance of this study. The operationalised definition was presented to provide an understanding of the terminology used throughout the study. The following chapter, Chapter 2 presents a review of the relevant literature related to the study.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter provided the current issues and knowledge related to AB from previous studies. This review focused on the research questions and objectives as stated in the previous chapter. This chapter was organized into 9 sections: search term, definition, prevalence, associated factors, impact of AB, management of AB, information on related questionnaires to the present study, introduction to validation that would be used in the study, and gaps in the literature. This chapter ends with the conceptual framework of the present study.

2.2 Databases and search terms

The search engines that were used include Science Direct, Google Scholar, ProQuest, Cochrane and other database sources. It was done by searching the main keywords: “bloating, abdominal bloating (AB), prevalence of bloating, treatment of bloating, adult, management, severity, impact, QoL, “with Boolean logic “OR” and “AND”. Other than that, there were also an overview on the health-related behaviour to examine the lifestyle modification as an alternative to improve bloating with keywords such as “ physical activity or bloating, exercise or bloating, obesity or bloating”, and the related theory behind it, which is the “Theory of Planned Behaviour, Health Behaviour Model, Theory of Reasoned Action, Pender’s Theory of Health Promotion Model, attitude, belief”, and many more. The search was also diverged towards the external factors that can affect the whole results of the study which include “social support, physical activity, stress, depression, severity and

quality of life". Next, the information to be used in the study was revised and chosen based on the suitability to the present study.

Table 2.1 Summary literature search for the present study

	Search engine				
	Google Scholar	**PubMed**	**Scopus**	**ProQuest**	**Science Direct/ Sage Journals**
Using Phrase					
Abdominal bloating	13700	2491	6557	5993	17650
Theory of Planned Behaviour	32700	7571	11426	59330	68074
Health belief of abdominal bloating	2500	15	0	180	0
Health promoting behaviour of abdominal bloating	17000	4	1	176	1561
Prevalence of abdominal bloating	9220	587	846	844	7598
Factors associated to abdominal bloating	11500	255	517	1156	11594
Treatment for abdominal bloating	14000	1660	3603	1306	15126
Using Boolean operators and keywords (example)					
"Abdominal bloating" AND "Theory of Planned Behaviour"	10600	2	1	64	496
"Health belief" AND "abdominal bloating"	3	18	8	180	1060
"Intention" AND "abdominal bloating"	2760	39	144	161	1066
"Health promoting behaviour" AND "abdominal bloating	16100	4	1	176	1561
"Abdominal bloating" AND "severity"	12300	693	1201	682	8313
"Abdominal bloating" AND "quality of life"	9700	376	970	824	6866
"Abdominal bloating" AND "social support"	5910	31	27	374	2637
"Abdominal bloating" AND "factors associated"	11600	255	517	1156	11594
"Abdominal bloating" AND "treatment"	14000	1660	3603	1307	15126

2.3 What is abdominal bloating (AB)

The definition given by the Cambridge Dictionary for AB is an uncomfortable condition in the stomach (Cambridge Dictionary, 2020a). AB is one of the descriptors for mystical abdominal sensation and to the objective distension which is subjectively different between individuals. Asian people usually use the term “a lot of gas” or “angin” in Malay language to describe the sensation of AB. The bloating term was used to refer to the sensation of stomach with an increase in girth or some use it to explain the uncomfortable feeling inside the stomach (sensation of a full belly or excess gas or the feeling of abdominal pressure or wall tension). Lacy et al. (2011) defined AB as “a sense of gassiness or a sense of being distended where measurable distention does not have to occur”. While others use it to explain various other related conditions such as burping, nausea, cramps or rumbling stomach (Azpiroz & Malagelada, 2005).

“AB and distension” terms were commonly used by medical practitioners to explain the subjective sensational feeling in the stomach and increase in abdominal girth (Azpiroz et al., 2007; Azpiroz & Malagelada, 2005; Villoria et al., 2006), whereas there were a lot of other terms used by Malaysians to infer to the similar problem. Asian patients usually expressed the same symptoms as “a lot of gases in the stomach”. In Malaysia, terms like “angin”, “kembung” (bloated), “perut besar dari biasa” (stomach bigger than normal) and “sengkak” (tightness) were always used by Malaysians to describe AB and distension. As the variation in the two symptoms pattern were commonly overlapped, distinguishing the symptoms could be hard for most of the people.