

The image features a vibrant still life of fresh fruits and a healthy meal. In the foreground, a clear glass bowl is filled with granola, topped with two bright red raspberries, a slice of orange, and several slices of green kiwi. Behind the bowl, a glass jar with a metal clasp lid is filled with golden honey, with a wooden honey dipper resting on top. To the left, a yellow plate holds a sliced red apple and a whole raspberry. The background is a soft-focus blue and white patterned surface.

The Effect of Lifestyle Modification in Treatment of Constipation in Older Adult

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Abstract

Constipation is a common problem in the older adults, occurrence increases exponentially in persons aged more than 65 years [1]. Constipation can be a bothersome symptom that can have a detrimental effect on the older adults' health related quality of life and places a vast financial burden on both the older adults and the health care providers [2]. If constipation is not managed constructively, the older adults can encounter harmful consequences [3]. It can have a significant influence on the quality of life of the older adults [3].

Boasshard et al. [4] stated that constipation results from a mixture of risk factors, such as decreased fibre and fluid intake, and reduced physical activity. They proposed that modification of lifestyle factors, including increase in fluid intake, habitual physical activity and dietary modification may reduce incidence of constipation in the older adults. A number of research studies on lifestyle modification, such as improve on fluid intake, physical activity and high fibre intake have been demonstrated to be effective in treatment of constipation in the older adults.

This paper will critically appraise the clinical research literature, which addresses the effectiveness of lifestyle modification studies in the management of constipation. A review of the literature will offer the reviewer with the latest theoretical and logical information about the specific issues and identify a combination of what is known and not known about this topic [5]. Moreover, a literature review also provides the reader with a circumstance for understanding existing information on a subject matter and enlightens the implication of the findings. Polit & Beck [6] stated that continuous quality improvement through clinical research makes current healthcare more effective, hence the impact and changes are also come from the evidence of clinical research which is very significant. The author will implement a detailed and precise search strategy by ensuring the review will be comprehensive and thorough and ought to incorporate all relevant up-to-date references. This will involve examination of an extensive range of literature, consisting electronic, hand and Internet searches of relevant articles and databases by selecting keywords. After the literature search, a high quality review needs to be done in a systematic manner by making the decision rules need to be clear in evaluating the literature. Furthermore, the criteria for including or excluding the study need to be specific. However, in view of the fact that the evidence of this topic is already well-established, the author may foresee difficulties in searching for recent papers pertaining to the research question. There are two main approaches to reviewing literature which are narrative reviews and systematic reviews [7]. The author has adopted narrative approach in view of limitations such as time constraints and lack of impactful articles. The author will evaluate and critique the quality of each article in order to draw conclusions about the overall body of evidence and identify gaps in the current evidence base. An analytical framework is then applied [6]. The author will also conclude with a concise summary of current evidence. The critical summary should be able to demonstrate the need for future research or clinical improvements.

Introduction

Constipation is a common debilitating symptom in the older adults but it often remains unrecognized until the older adults develop associated complications. According to Bosshard et al. [4] the prevalence of constipation demonstrates that ranging from 15 percent to 20 percent in the community older adults residents and up to 50 percent in nursing home populace. A higher incidence of constipation in the older adults who are 65 years old or older has been noted [1]. An older adult is defined as someone who is of chronological age of at least 65 years [8]. Constipation is a widespread issue in the older adults and accounting for about 2.5 million general practitioner office visits yearly [9]. In South East Asia, self-reported surveys indicated about 30 to 47 percent of the elderly population are overwhelmed with the condition with the sample size of 26104 subjects [10]. Despite the high prevalence of constipation in the older adults, there is scant quality of clinical research-based evidence available and there has not been much research since then on which management decisions to make in the older adults with constipation [4]. The definition of constipation varies between the medical and the older adults population perspectives [11]. Foxley [3] mentioned that according to the International Classification of Constipation, constipation is diagnosed when at least two out of the following six criteria are present for at least twelve weeks in the preceding twelve months as following:

Bowel Movements	Percentage / Frequency
Straining	At least 25 %
Lumpy or solid stools	At least 25 %
Sensation of incomplete evacuation	At least 25 %
Sensation of anal blockage	At least 25 %
Using manual manoeuvres to facilitate	More than 25 %
Having fewer than three bowel movements	per week

The American College of Gastroenterology Chronic Constipation Task Force proposed a broader classification of inadequate defecation categorized by sporadic stools, hard stool passage, or both, as constipation [11]. Furthermore, the Bristol Stool Form Scale is to categorize stool consistency, may be a useful guide in managing constipation [12]. These guidelines and classifications were derived from previous clinical research using quantitative analysis [13].

Physiological Processes of Ageing in Relation to Constipation

Constipation in the older adults is multi-dimensional with underlying aetiologies [11]. Moreover, Basson [14] stated that low dietary fibre intake, poor fluid intake and reduced mobility will further increase the risk of constipation especially in the older adults. Other disorders such as malignancy, endocrine disorders, neurologic disorders and anatomic dysfunctions are also known to be the common secondary causes in constipation [1]. The older adults may

also ignore the call to defecate due to environmental factors Managing Constipation in the Elderly [15].

Deepak & Ehrenpreis [16] stated that modifications in the structure and function of the ageing colon consist of reduced rectal conformity, improved sensory threshold for an urge to defecate, and reduced resting and compressing pressures in the anal canal. According to Gallagher & O'Mahony [13], the categorization of normal transit constipation, slow transit constipation and disorders in defecation are commonly used to categorize constipation from a physiological perspective.

Ginsberg et al. [1] reviewed that constipation poses considerable psychological and economic burdens; it can compromise the general psychological well-being, with indicator severity in reverse related to perceived health related quality of life. Bharucha [17] highlighted that the older adults probably account for a significant amount of the expenditure of prescribed and non-prescribed laxatives because of the problem of constipation. Spinzi et al. [2] stated that research has created the awareness of constipation as a highly prevalent and bothersome disorder that negatively affects older adults' physical, social and professional lives and places a great economic burden on both patients and national health services. Therefore, the problems of constipation being faced by the older adults, have led to pharmacological and non-pharmacological interventions.

The American Gastroenterological Association guidelines on constipation are mainly based on the professional view and supported that lifestyle modification such as increase fluid intake, fibre intake and physical activity, followed by laxatives [18]. Thus, nurses have a potentially significant part to play in both the prevention and management of constipation by providing lifestyle advice to the older adults on attention to increase high fibre intake, sufficient fluid intake and regular exercise. Smith [19] stated that although ageing is linked with constipation, it is the reasons related with getting old such as insufficient fluid intake, low levels of exercise, immobilization and inadequate intake of dietary fibre which may be influential. Henceforth, lifestyle modification is frequently projected as primary step in management of constipation [4].

Aim and Research Question

For the intentions of writing this paper, a literature review of clinical research was carried out to deliberate the research question 'Is lifestyle modification effective in treatment of constipation in older adults?' The purpose of this review is to critique and assess the relevant clinical research based evidence available on the effectiveness of lifestyle modification such as an increase in fluid intake, physical activity and high fibre intake in the treatment of constipation in the older adults. The outcomes will thus be derived from the evidence and data to ensure that the best clinical practice is carried out. Bosshard et al. [4] emphasized that constipation appears more commonly in the old and frail, although age per se does not seem to be an independent risk factor for constipation, the combined effect of decreased activity, change in diet, multiple diseases as

well as multiple drugs treatment, would appear to place them at an additional risk [4]. It is difficult to make a strong deduction from the existing literature whether lifestyle modifications are effective in the treatment of constipation in older adults. There are also no approved guidelines in the use for managing constipation in older adults by implementing lifestyle modification. In order to respond to the uncertainty posted by this research question, the author has decided to perform a comprehensive literature review. The aim of this is to evaluate the existing clinical research based evidence in order to bring improvements to current clinical practice namely in the quality of life of the older adults. The author hypothesizes that lifestyle modifications improve constipation in older adults. It is hope that this comprehensive review will be constructive and helpful to health care workers who care for the older adults with constipation, within geriatric care department setting particularly in reduction of financial burden and improvement in quality of life.

Methods

Scientific literature review articles are methodological studies which use database searches to retrieve results of the research [6]. In view of the fact that there is a massive pool of knowledge, the clinicians hence need a reliable system of management [7]. One essential part of such a system is a method of summarising primary research findings into a form that provides a trustworthy overview of the current knowledge [7]. Two main types of review articles are commonly found in the scientific literature: systematic and narrative review [6]. Burns & Grove [5] stated that narrative literature review articles are publications that describe and discuss the state of the science of a specific topic or theme from a theoretical and contextual point of view, normally use a qualitative approach. On the other hand, a systematic literature review is a well-planned review to answer specific research questions using a systematic and explicit methodology to identify, select, and critically evaluate results of the studies included in the literature review [5]. Systematic literature reviews are considered original work because they are conducted using rigorous methodological approaches [5]. Moreover, systematic reviews come from synthesized literature and offer broader foci on the subject matter [6]. In this paper, a narrative review was adopted because of the time constraints and the lack of impactful studies which impair the reliability and accuracy of the conclusions. Thus, the results can be unequivocal and there will be difficulties in interpretation and appraisal [20].

The literature review is designed to permit assessment and summary of a suggested topic Polit & Beck [6]. Newhouse et al. [21] believes that in the delivery of care such as medical treatment or nursing care, the professional practices need to be based on the best available research or evidence base knowledge and ought to be constantly appraised and kept up to date to make sure that the health care workers are able to perform the best care for the patients.

Polit & Beck [6] highlighted that literature reviews play a

critical role for the health care workers in seeking to develop an evidence based practice in the research process. The practice of evidence based medicine means integrating individual clinical expertise with the best available external clinical evidence from systematic research [22]. Evidence based practice performs a critical review of how health care workers and outcomes are correlated, informing decisions that can result in the quality of care enhancement [23].

Being an important part of evidence based practice, the literature review and search are vital to any research study and publication activity, as it allows researchers to obtain a better awareness of the research topic and an understanding of the appropriate research literature and articles [21]. On the contrary, the limitations of literature reviews are mostly time constraints and the proficiency level of the researchers [6].

A framework is the theoretical foundation of a study and is often implicit as it may not be readily found within the literature [6]. The researchers are required to review pertinent research studies for theories and analytic models that are relevant to the research problem [6]. Burns & Grove [5] stated that quantitative and qualitative research complements each other as they create different types of information that are helpful in the research practice. Quantitative research is an official, objective and methodical manner in which arithmetical data are used to attain information about the topic [24]. It also involves statistical manipulation of numeric data for the rationale of explaining phenomena or making interferences about how phenomena are connected [25].

A randomized controlled trial is a full experimental test of an intervention, involving random assignment to the treatment group under tightly controlled conditions [26]. It is often the phase III of a full clinical trial and the objective is to develop evidence about the treatment or intervention's efficacy whether the treatment or intervention is more efficacious than the standard treatment or an alternative counterfactual [27].

On the other hand, qualitative research is the investigation of phenomena naturally in deepness and holistic manner, through the collection of rich description materials using a flexible research design [25]. As highlighted by Burns & Grove [5], the organization and analyses of narrative data for the reason of ascertaining significant are underlying themes, categories and patterns. The information gathered is narrative, this is in non-numeric form, such as the record of an unstructured interview. This subjective method is used to explain the life experiences and provides them value [27]. The reasoning process employed in qualitative research includes perceptually putting pieces together to make wholes [26]. This paper illustrates a narrative review of literature pertaining to constipation in the older adults including both quantitative and qualitative research. The following inclusion and exclusion criteria will be applied in the identification of the literature review and are based on an initial search of the literature.

Inclusion Criteria

- i. The research human subjects to be included within this literature review will be the older adults who aged 65 years old and above World Health Organization [8] as there is minimal age related changes in gastrointestinal system.
- ii. The studies will encompass the research human subjects must be able to communicate and participate voluntarily, no restriction to ethnicity and the older adults must report problem of constipation.
- iii. The research papers identified within this literature review will be mixed (including both qualitative and quantitative approaches), mainly to those embracing a quantitative research method, generally randomized controlled trials which are associated with the subject matter under study.
- iv. Studies must have ethical approval.

Exclusion Criteria

In order to address the research question, the studies will be excluded for the following points:

- i. The research human subjects who have bowel incontinence and gastrointestinal disorder because these conditions will affect their bowel function.
- ii. The research human subjects who are on ileostomy and colostomy as their way of defecation are different.
- iii. The older adults on enteral feeding are being excluded because they only consume fluid.
- iv. Fluid restriction research human subjects will be excluded as increase chance of passing hard or lumpy stools.
- v. Human subjects who are on regular dose of laxatives need to be excluded as it may alter the result.
- vi. Literature or articles, which are unpublished or not published in English language, will be excluded as the author has difficulty understand the content and interpret the findings.
- vii. There will be no restriction of date for the data reviewed so that majority of the applicable articles will be included.

Literature Search

The literature search is an essential component to any research and publication activity, as it allows researchers to obtain a better awareness of the research topic or question and an understanding of related literature [27]. The author will embrace a search strategy and make certain a strong literature review from a diversity of sources or database in order to promote authenticity and the clinical application of findings. The author will also look for an extensive range of literature in which comprise of electronic, hand and Internet searches of relevant articles and databases

by selecting the key words. Information and proofs can be composed from a range of resources. The electronic searches consist of Medline, Cinahl, Proquest, Ovid, Cinahl Plus with Full Text, Cochrane Library, EBSCO and PubMed. These databases were picked in view of the robust medical and health care related literature and articles. Moreover, these databases are well recognized and universally acknowledged. An Internet search for main resources and guideline may be related to the extended literature review such as Consolidated Standards of Reporting Trials (CONSORT) [28] and Preferred Reporting Items for Systematic Reviews and Meta Analysis [29]. PRISMA is an evidence-based minimum set of items for reporting in systematic reviews and meta-analyses [29]. The author will adopt Google Scholar search engine as well. A hand search of key journals will also be embraced to perform a meticulous and comprehensive search in order to ensure un-indexed literature will be identified. For instance, Journal of Gastroenterology, Clinical Journal of Oncology Nursing, British Medical Journal, Journal of Family Practice and Journal of Gerontology. Selecting possible key words and synonyms from the clinical research question should be the primary step in searching the data or articles, which includes the key words based on the research question raised in PICO format [21]. PICO is stands for patient/population/problem, intervention, control/comparison with other interventions and outcomes [21]. PICO outlines the problems evidently and assists the evidence search by recognizing main key words [21]. The key words for this research question consist of constipation, lifestyle modification, fibre intake, physical activity, fluid intake and older adults. The author used the PICO framework with the PubMed Clinical Queries in the form of template to filter the articles [30]. It is well-established that lifestyle modification including fibre intake, physical activity and fluid intake all improves constipation in the older adults and hence these keywords are chosen [31].

The search strategies are established by breaking the defined question into personal concepts, followed by choosing words and phrases which use to explain the concepts [24]. Newhouse et al. [21] affirmed that the use of Boolean operators AND, OR and NOT, to intermix the key words and phrases with controlled vocabulary to generate a promising set. Thereafter, use the limits where suitable such as age, date of publication and language. It helps to search more proficiently by utilizing filters designed to eliminate extraneous retrievals [6]. There will be no restriction for date of publication upon this search strategy, as the author does not want to overlook any valuable pieces of literature or articles, which may be significant to the review. For the language, the author will merely choose the literature or articles in English language because the author has difficulty in comprehend and interpreting other languages. The last step in searching the proof consists of reassessing the outcomes to establish whether they are related to the research question and then amending the search strategy if needed [25]. In total, 149 articles were identified from the databases (Table 1). The 149 articles were considered

to be too many for review and were subjected to initial filtering for their relevance in two steps (Appendix I). In the first step, the articles comprising of any of the above keywords which appears in their titles will be remained and those without any keywords in the title are removed. Next, the abstracts of the remaining 86 articles were reviewed and those with relevant information in the abstract were kept. The 54 articles that did not consist of any relevant information to the topic in the abstract were filtered out. The potential limitation of this approach is the articles which

may have relevant information pertaining to the topic of interest can still be filtered out if the title and keywords of the study do not include the key terms which the author is searching for. At the end of the initial filtering, 32 relevant articles were identified and subjected to a more refined quality assessment for their validity, clinical usefulness and relevance in the particular context (Appendix II). The author has reviewed these 32 articles thoroughly and provided the critical analysis (Appendix III).

Table 1: Number of articles identified from different database using different searching keywords or search terms with the application of different limits.

Database	Keyword / Term	Limits	Number of Articles Identified
Medline	“constipation” and “lifestyle modification” and “fibre intake” and physical activity” and “fluid intake” and “older adults”	Linked full text, English language	15
CINAHL	“constipation” and “lifestyle modification” and “fibre intake” and physical activity” and “fluid intake” and “older adults”	Linked full text, English language	5
Proquest	“constipation” and “lifestyle modification” and “fibre intake” and physical activity” and “fluid intake” and “older adults”	Linked full text, English language	20
OVID	“constipation” and “lifestyle modification” and “fibre intake” and physical activity” and “fluid intake” and “older adults”	Linked full text, English language	22
CINAHL Plus with Full Text	“constipation” and “lifestyle modification” and “fibre intake” and physical activity” and “fluid intake” and “older adults”	Linked full text, English language	15
COCHRANE Library	“constipation” and “lifestyle modification” and “fibre intake” and physical activity” and “fluid intake” and “older adults”	Linked full text, English language	19
EBSCO	“constipation” and “lifestyle modification” and “fibre intake” and physical activity” and “fluid intake” and “older adults”	Linked full text, English language	21
PUBMED	“constipation” and “lifestyle modification” and “fibre intake” and physical activity” and “fluid intake” and “older adults”	Linked full text, English language	32

Analytical Framework

The intention of an analytical framework is to provide the research study an analytical and disciplined method, permitting a methodical assessment of the findings and therefore allow the researcher to recognize the key data required to come to a conclusion [5]. Moreover, Burns & Grove [5] stated that adopting an analytical framework

can provide a means of capturing contextual issues important to a review and it is vital for the apprentice researchers. The author had identified two recognized and qualified frameworks. The Cochrane collaboration is a worldwide organization that seeks to assist well-informed decisions about health care by organizing and circulating systematic reviews of the consequences of the health care

implementations [32]. An excellent source of research publications in the Cochrane Library Collection is available online at <http://www.cochrane.org> [5]. The Cochrane Library is a compilation of seven databases used to establish evidence summaries or synthesized reviews of the health care implementations, consisting of the Cochrane Database of Systematic Reviews [21]. The reviews are greatly prepared and methodical, including or excluding evidence based on explicit quality criteria to reduce bias. Polit & Beck [6] stated that Cochrane reviews are based on the best available information about health care interventions. They discover the proof for and against the usefulness and suitability of treatments in particular conditions. It is highly linked to the author's research question in this extended literature review assignment. LoBiondo-Wood & Haber [24] also stated that the Cochrane Library could be a concrete resource for locating data base interventions in nursing practice. This tool may be suitable to use in critiquing and analysing the data [6]. CONSORT guidelines are also known as Consolidated Standards of Reporting Trials, used worldwide to increase the reporting of randomized controlled trials [6]. Besides, CONSORT Statement for randomized controlled trials of non-pharmacological intervention, built upon the CONSORT checklist, takes into concern particular problems when assessing non-pharmacological intervention, such as complexity of blinding, the difficulty of the implementation and the influence of care providers' proficiency and amount of care of centres on treatment effect [28]. Horr, Messinger-Rapport & Pillai [33] stated that the CONSORT non-pharmacological guidelines help in aiding the critical analysis of quantitative studies. The main product of CONSORT is the CONSORT Statement, which is an evidence-based, minimum set of recommendations for reporting randomized trials [28]. It offers a standard way for authors to prepare reports of trial findings, facilitating their complete and transparent reporting, and aiding their critical appraisal and interpretation. Boutron et al. [34] stated that the use of the extension to the CONSORT Statement should improve the quality of reporting randomized, controlled trials assessing non-pharmacological treatments. The non-pharmacological treatments cover a wide range of interventions, such as surgery, rehabilitation, physiotherapy, complementary medicine, behavioural therapy and patient education, such as lifestyle modification [34]. Hence, Boutron et al. [34] proposed the non-pharmacological methods preferably as lifestyle education, for instances, increased fluid intake, habitual physical activity and high fibre intake.

There are many guidelines and tools used for critical analysis of articles. For instances, Cochrane Collaboration's tools for assessing risk of bias [35] for systematic review and Guidelines for Critical Review of Qualitative studies [36] for qualitative analysis. In this study, the author applied database search including Cochrane and PubMed because this is a narrative review and not a systematic review. CONSORT guideline was applied in the critique analysis of the articles ([Appendix III](#)).

Ethical Considerations

Polit & Beck [6] highlighted that ethics is a structure of moral principles that is concerned with the extent to which research measures hold on to the proficient, lawful and social responsibilities to the study human subjects. Polit & Beck [6] also stated that there is an issue relating to the human subjects, which is the mental capacity of the older adults. Therefore, it is crucial to ensure that the mental capacity of the older adults is capable and able to give informed consent in order to partake in the research study [6]. One predominantly significant procedure for protecting human subjects and safeguarding their rights to self-determination includes attaining the informed consents of the older adults [5].

Discussion

This review focuses on exploring each of the arguments on fibre intake, physical activity and fluid intake with more detailed elaborations and supporting evidence (Table 2). Arguments made in relation to lifestyle modification in treatment of constipation in older adult. Fibre Intake in relation to constipation in the older adults. The following articles have discussed and demonstrated how Clinical Research has led to improvements in the advice given on how fibre intake related to constipation. Firstly, Spinzi et al. [2] emphasized that the first steps in the treatment of simple constipation include increasing intake of dietary fibre and the use of a fibre supplement. Annels & Koch [37] also demonstrated their study that fibre intake was considered the key factor for the five elderly participants who are cured of constipation. Moreover, Rao & Go [38] stated that constipation in elderly without an underlying motility disorder have improved or resolved with this amount of supplemental fibre. Nonetheless, Leung et al. [31] argued that dietary fibre intake in preventing constipation is not proven. Another review of dietary fibre in 269 institutionalized constipated older adults (eight studies of moderate high quality) also found that dietary fibre was not effective [2]. However, some of these studies includes the extent of publication bias and may have included several smaller studies which have potential selection and interviewer bias. Another study has revealed that increased dietary fibre intake leads to decreased colonic transit time and bulkier stools [39]. Sykes [40] also stated that meta-analysis has confirmed the dietary fibre supplementation increases stool weight and decreases transit time in both normal and constipated older adults. In addition, another meta-analysis of 20 non-randomized controlled trials demonstrated that adding bran to the diet increased stool weight and shortened transit time in the older adults [2]. Therefore, Gallagher & O'Mahony [13] stated that older adults with normal transit constipation usually have a good response to a therapeutic trial which is to increase dietary fibre. On the contrary, dietary fibre can also adversely affecting constipation, according to the participants of the study, has no effect in decreasing frequency of constipation, instead, it causes "binding up the bowel" making the faeces harder and bulkier, and limit its elimination from the body and if too much in diet, may also cause diarrhoea [37].

Table 2: Topics discussed in the identified articles.

Topics		Identified Articles
Arguments made in relation to lifestyle modification in treatment of constipation in older adult	Fibre Intake in relation to constipation in the older adults	Annels & Koch [37], Arnaud [41], Basilisco & Coletta [12], Cummings [42], Evans et al. [54], Gallagher and O'Mahony [13], Grant [43], Hsieh [39], Kacmaz & Kasikci [44], Leung et al. [31], Rao & Go [38], Spinzi et al. [2], Sykes [40],
	Physical Activity in relation to constipation in the older adults	Annels & Koch [37], Arnaud [41], Bosshard et al. [4], Everhart et al. [45], Gallagher & O'Mahony [13], Hsieh [39], Kalish & Loven [18], Leung et al. [31], Managing Constipation in the Elderly [1], Meshkinpour, Selod & Movahedi [47], Spinzi et al. [2], Sykes [40], Whitehead et al. [46],
	Fluid Intake in relation to constipation in the older adults	Annels & Koch [37], Arnaud [41], Bosshard et al. [4], Gallagher & O'Mahony [13], Ginsberg et al. [1], Hsieh [39], Leung et al. [31], Lindeman et al. [48], Managing Constipation in the Elderly [1], Spinzi et al. [2],

A prospective cohort study of 3327 women found that higher daily fibre intake such as 20 grams per day versus 7 grams per day significantly reduces the likelihood of self-reported constipation [31]. Gallagher & O'Mahony [13] also indicated that it is generally recommended that dietary fibre should be increased to 20 to 25 grams per day in older patients with constipation. Furthermore, Hsieh [39] also stated

that the recommendation is to increase fibre by 5 grams per day each week until reaching the daily recommended intake which is 20 to 35 grams daily. Nevertheless, Hsieh [39] argued that if fibre intake is substantially less than the required amount, the older adults should be encouraged to increase their intake of fibre rich foods such as bran, fruits, vegetables and nuts. Annels & Koch [37] revealed

that all 90 participants include some specific fibre food such as fruit and breakfast cereals in their diet in an effort to prevent constipation, but they tend to be disheartened about the effectiveness of this strategy. Furthermore, Basilisco & Coletta [12] stated in a dietary review that one should not only consider the reduced fibre intake that may cause constipation, but also the possibility that a normal or excessive fibre intake can cause bloatedness and abdominal pain, particularly in patients with delayed transit. Spinzi et al. [2] also emphasized that fibre can aggravate abdominal bloatedness and cause flatulence in some cases, resulting in a decline in patient compliance. Basilisco & Coletta [12] argued that increasing their fibre intake does not normalise colonic transit and can even worsen their symptoms as a result of the gas produced by fibre metabolism. Besides, Basilisco & Coletta [12] pointed out that a fibre rich diet accelerates transit time, softens stool and increase stool weight, but a diet that is poor in fibre can induce constipation. Bran is a bulking agent with capacity to hold water in the stool, thereby improving bowel function [41]. Moreover, Cummings [42] proposed that cereal fibre in the form of bran may be more effective than fruit and vegetable in treating constipation, which suggests that not all the components of fibre contribute equally to this improvement in bowel habit. Another more recent randomized controlled trial (RCT) demonstrated that dried plums were more effective than psyllium in the management of mild to moderate constipation [38]. Psyllium is a form of fiber made from the *Plantago ovata* plant, specifically from the husks of the plant's seed [38]. Basilisco & Coletta [12] argued that a soluble fibre psyllium may benefit some patients with chronic constipation but unlike osmotic and stimulant laxatives and the newer pharmacological agents, this treatment is supported by poor quality data. Besides, lignin has also been used as an anti-diarrheal agent and may counter the cathartic effects of cellulose and hemicellulose [42]. Lignin is an organic substance binding the cells, fibres and vessels which constitute wood and the lignified elements of plants, as in straw [42]. After cellulose, it is the most abundant renewable carbon source on Earth [42]. Gallagher & O'Mahony [13] stipulated that the best way to add fibre is by making subtle and gradual changes to the diet with foods that are high in residual fibre such as bran and other whole grains, fruits, vegetables or nuts. Arnaud [41] stated that diets containing fibre result in large, soft stools going rapidly through the intestine. As such, many slimming diets lead to constipation due to inadequate fibre content [41]. Grant [43] revealed in the study that the daily menu of three elderly patients who are 65 years old and above was allowed to have a choice of food. The high fibre diet has been chosen in most cases to show the optimum fibre available and it helps to prevent constipation [43]. Different cereals and types of bread have also been selected to show how this affects daily fibre intake [43]. These results give a valuable picture of the fibre content of the diet in preventing constipation and clearly there is a scope for improvement in the menu for the elderly [43]. It is clear in encouraging higher fibre intake in the older adults and ensuring that the menu contains suitable food

choices. Besides, Grant [43] also revealed an audit of the use of laxatives revealed a very high laxative use, despite the finding that the potential fibre and fluid provided by the normal menu are adequate. The main problem was the inadequacy of the actual fibre and fluid intake of older patients [43]. During the observation, it was noted that the intake of high fibre food was not actively encouraged in the ward [43]. Patients were simply given what they requested and were not encouraged on appropriate choices [43]. Besides, Kacmaz & Kasikci [44] revealed the results of their study that planned nursing interventions including bran supplement are more effective than routine nursing interventions for management of constipation problems in older orthopaedic patients. The effectiveness of a high fibre diet in the treatment of constipation has been reported positive for the older adults residing in the community and in the long term care settings [44]. However, the studies that have failed to find an association between fibre and bowel function generally have been performed on groups with low dietary fibre intake, compared with studies that have shown a significant beneficial effect [40]. Spinzi et al. [2] highlighted that patients with severe constipation or those unable to comply with the recommended intake of fibre may benefit from the addition of laxatives. Thus, those with a poor response to dietary fibre may have slow transit constipation or disorder in defecation and should receive a therapeutic trial of laxatives [13].

Physical activity in relation to constipation in the older adults

The following articles have discussed the association between physical activity and constipation in the older adults. The National Health and Nutrition Examination Survey done in the United States of America with 14407 participants demonstrated that low physical activity level is associated with a twofold increased risk of constipation [45]. Leung et al. [31] also stated that one small, non-placebo randomized control trial study reported that regular exercise decreases constipation as per ROME I criteria revealed that physical activity significantly decreased constipation in women. Moreover, self-reported constipation has been found to correlate inversely with the level of physical activity [40]. However, Hsieh [39] stated that although the older adults should be encouraged to be as physically active as possible, there is no consistent evidence that regular exercise relieves constipation. Bosshard et al. [4] stipulated that the data regarding the effect of physical activity in the management of constipation are also limited and none are specific to elderly persons as well. Annels & Koch [37] revealed in their study that few participants mentioned about their constipation commenced or became worse when they were immobilised, either temporarily or permanently. Another epidemiological study revealed that patients who are sedentary are more likely to complain of constipation [46]. Therefore, ambulation may stimulate defecation [37]. Nevertheless, Kalish & Loven [18] revealed two randomized control trials investigating the effect of exercise on 246 institutionalized older patients indicated no improvement in

constipation. While several observational studies suggest a protective effect of physical activity on constipation, data from interventional trials that studied the effect of exercise on transit time are conflicting [4]. Furthermore, Meshkinpour, Selod & Movahedi [47] demonstrated a study of eight patients whom were more than 65 years of age did not find any improvement in constipation after a 4 week exercise programme. Arnaud [41] highlighted that upright posture and exercise have been shown to promote colonic motility. Sykes [40] stated that enforced immobility in the form of bed rest has been said to increase the risk of constipation. Indeed, as the translocation of colonic mass has been associated with physical activity, reduction in mobility will likely impair the chief form of propulsive contractility in the large bowel, thus contributing to constipation [40]. Another study also revealed that restriction of physical activity for two weeks was associated with reduced colonic transit in a small group of active elderly subjects (Managing Constipation in the Elderly, 2007). In addition, there is evidence of faster transit time and more colonic propulsive activity after exercise [40].

Nevertheless, Spinzi et al. [2] stated that constipation is the most frequent among relatively inactive people, especially bedridden patients and many reviews recommend exercise, and although there is actually no clear evidence that this relieves constipation. Consequently, Gallagher & O'Mahony [13] stipulated that exercise should be encouraged for all older people as it is associated with a wide range of health benefits such as be as active as possible, prevent or reduce disease and manage or reduce stress.

Nonetheless, the participants generally thought that exercise was good for one's health and might help move the contents of the bowel along the intestine, but they were not convinced that the lack of exercise was the cause of chronic constipation [37]. Besides, Annels & Koch [37] highlighted that there are also potential risks for some older adults who lack of safety awareness and may be prone to falls during exercise, increasing the risk of fractures. Regular exercise is frequently recommended for management of constipation, though there is insufficient evidence to support this [13].

Fluid intake in relation to constipation in the older adults

The following articles have demonstrated the relationship between fluid intake and constipation in the older adults. Hsieh [39] stated that adequate hydration is considered to be important in maintaining bowel motility. Despite the belief that lack of fluid increases the risk of constipation, few studies also have provided evidence that hydration is associated with the incidence of constipation [39]. Leung et al. [31] also indicated that there is a link between insufficient fluid intake and constipation in his three months prospective study of 21012 nursing home residents aged more than 65 years. Furthermore, another randomized controlled trial revealed that higher fluid intake improved chronic constipation in the presence of a high fibre diet [31]. Conversely, another study of more than 21000 nursing

home residents found a weak association (odds ratio 1.49) between decreased fluid intake and constipation [15]. Adequate fluid intake may promote general health in many patients; however, decreased fluid intake does not appear to be a major cause of chronic constipation [15].

Hence, Annels & Koch [37] emphasized that the recommended daily amount of fluid to prevent constipation is either 1.5 litres or 2 litres in the older adults. Nevertheless, the reasons of limiting fluid intake are increased amount of urine, the need to urinate and personal preference to only drink when feeling 'thirsty' [37]. Gallagher & O'Mahony [13] stated that older patients with chronic constipation are often advised to increase their fluid intake in health care settings. Nonetheless, Arnaud [41] stated that daily fluid intake of less than three glasses, three to five glasses and six or more glasses revealed no significant associations with the frequency of chronic constipation in 796 participants of the New Mexico Elderly Health Survey. When fluid intake was increased, the discrepancies of the results may be explained by a beneficial effect limited to subjects with dehydration, while fluid overload will not improve stool consistency [41]. Furthermore, Bosshard et al. [4] also emphasized that attention should be given to the potential risk of fluid overload in frail elderly patients experiencing congestive heart failure or renal failure. However, there is no scientific evidence to support the advice of increasing fluid intake and caution is required when increasing fluids in older patients with renal or cardiac failure [13]. Besides, Annels & Koch [37] proposed that the particular fluids may indeed be useful as a solution for constipation, such as prune juice and orange juice. Dehydration is also generally accepted as a potential risk factor for constipation and has been associated with a slower transit time in some observational studies [4]. In the elderly, dehydration was a cause of constipation and a significant relationship between liquid deprivation from 2500 ml to 500 ml per day and constipation was reported [41]. Furthermore, Gallagher & O'Mahony [13] also stated that dehydration of the colonic contents will harden the stool consistency. Nevertheless, Annels & Koch [37] highlighted that fluid intake does not necessarily determine stool bulk or speed up colonic transit time. The evidence based documentation related to a high fluid intake being effective in avoiding chronic constipation is hard to find [48]. Data regarding the benefit of increased fluid intake are also lacking [4]. Spinzi et al. [2] stated that fluid intake is important for maintaining intestinal motility; however few studies have correlated poor hydration with constipation. Fluid losses induced by diarrhoea and febrile illness alter water balance and promote constipation [41]. In adult and elderly subjects, poor intake of water or excessive loss of fluid and electrolytes from the body such as during vomiting, high sweat rates or from renal disease can reduce water content of the stools and lead to constipation [41]. Besides, Ginsberg et al. [1] also stated that many older adults also voluntarily restrict fluid intake in order to reduce urological symptoms, which is an approach that may increase the risk of constipation and worsen urological symptoms because of anatomical obstruction from constipated stool in the descending colon

or rectum. Annels & Koch [37] revealed their study that the discernible reasons why the elderly participants may not consume the amount of fluid each day have been reported as increasing the amount of urine and need to urinate when they have tried drinking more fluid but no cure or improvement of constipation resultant. As a result, none from these five participants claimed success with overcoming constipation by only increasing fluid intake [37]. On the downside, Lindeman et al. [49] also stated that increased fluid intake leads to increased urine volume and more opportunities for urinary incontinence, which can be a major inconvenience for the older adults and their caregivers. Moreover, encouraging fluid intake after dinner can result in frequent awakening at night and resultant loss of sleep [49]. Despite the fact that chronic constipation had been observed with deficiency in dietary fibre, fluids or physical activity, lifestyle modification to prevent or treat chronic constipation is still unsubstantiated [31]. Furthermore, Grant [43] also stated that chronic constipation can have many causes including a low fibre diet, reduced physical activity and loss of bowel muscle tone through the natural aging process. However, short-term constipation in the older adults can also occur during acute hospital admissions during which the main causes are immobility or bed bound elderly patients and reduced fibre and fluid intakes [43]. Bosshard et al. [4] stipulated that increased fluid intake, regular physical activity and high fibre intake are usually proposed as first step non-pharmacological measures. In addition, Leung et al. [31] demonstrated that the classic triad of increasing dietary fibre, physical activity and fluids will benefit the older adults with actual deficiencies. Wolfsen, Barker & Mitteness [49] emphasized that the optimal treatment of constipation focuses on increasing fluid and dietary fibre intake, increasing activity levels and promoting good bowel habits without resorting to laxatives. Important factors contributing to its occurrence are inadequate fluid intake, lack of exercise, immobilization, insufficient intake of dietary fibre and adverse medication reactions [44]. Kacmaz & Kasikci [44] suggested that it is widely accepted within nursing that diet, fluid and exercise level are prime factors that influence faeces elimination from the human body and that these factors primarily requiring attention by those who have a propensity to constipation. Kalish & Loven [18] also indicated that the most common first line treatments are dietary fibre, fluid intake and exercise but the evidence is insufficient to support this approach in the geriatric population. However, Bosshard et al. [4] also argued that adherence to these measures is limited and pharmacological treatment is frequently required. Therefore, elderly persons likely account for a substantial proportion of the costs of prescribed and non-prescribed laxatives, estimated to amount over \$US500 million dollars in the United States of America [4]. The author proposed that more research is required on this financial aspect as the cost could have gone up over these 11 years. Rao & Meduri [11] stated that a food diary was established to assess fibre and fluid intake as well as the number, frequency and nutrient content of meals. It also allows in facilitating the recognition and

causes of constipation [11]. Nonetheless, the advice of attention to dietary fibre, adequate fluid intake and regular exercise has been useful to some of the older adults, has not always resulted in success [37]. This may be due to constraints which the older adults express such as the expense of fruit and vegetables, a tendency to urinary incontinence or not feeling safe to take walks alone [37]. In geriatric studies, however, intestinal function is generally seen as part of a more general picture, assessing the older adults' physical performance and considering models for managing their rehabilitation and the side effects of their medication, rather than defining the constipation symptom's specificity [50]. Rao & Meduri [11] also demonstrated that failure to respond to the physiological urge to defecate after waking up and post-meal may predispose to constipation. Another concern of studies with dietary supplements are not scrutinised to the same extent that drugs trials are because manufacturers of dietary supplements are not required to prove safety or efficacy by conducting clinical trials on the line of a pharmaceutical product [51]. To some extent, the complex issue of dietary supplement products not to be used to treat any illness but to maintain good health whereas a clinical trial is classically conducted in a disease condition [51]. However, Hatle [51] also argued that the frequency and extent of drug reactions and interactions of ingredients used in dietary supplements are also not well defined.

Recommendations

Kacmaz & Kasikci [44] suggested that it is particularly important for planned nursing interventions including increasing daily fluid intake, increasing fibre in the diet, encouraging physical activity and regular exercise, timing and privacy. The standard advice of increasing dietary fibres, fluid intake and physical activity for relieving chronic constipation will only benefit the older adults with true deficiency [31]. In addition, Wolfsen, Barker & Mitteness [49] also proposed that the physician should encourage increasing physical activity; additional dietary fibre in small, gradual increments up to 10 to 20 gram per day; adequate fluid intake at least six cups daily and effective bowel habits and routine such as timed, regular and relaxed. Furthermore, Sykes [40] also mentioned that ensuring a daily water intake of at least 1.5 to 2 litres has been shown to have a positive effect, complementary to that of dietary fibre, on increasing stool frequency and reducing the use of laxatives.

Annels & Koch [37] demonstrated that dietary fibre preventing constipation is scant, that fluid intake does not determine stool bulk or encourage colonic transit time, and there is no proven link between exercise levels and chronic constipation. However, there is evidence that some food may stimulate defecation, adequate fluid is required when consuming bulking laxatives and that prolonged immobility can predispose to constipation [37]. Many cofactors, including cognitive function, medications and diet may play a role in chronic constipation in the older adults, but exercise may help in improving bowel function as part of a

broad rehabilitation program Managing Constipation in the Elderly [1]. Dehydration worsens constipation Managing Constipation in the Elderly [1]. Therefore, it is important to maintain adequate hydration as a prevention of constipation [41]. The amount of fibre in the diet, adequate bowel function relies on adequate fluid intake [40]. Moreover, Sykes [40] stated that decrease in fluids renders fibre less effective and also may produce a gelatinous mass in the intestinal tract from fibre supplements, which could contribute to intestinal obstruction. In addition, the financial burden and economic impact that caused by constipation in the older adults most probably can be reduced and be more cost effective in the health care system [45]. Leung et al. [31] stated that the older adults will potentially benefit if the proposed lifestyle modifications is successful, as it is not difficult to carry out this approach or routine activity in increasing physical activity, fluid intake and high fibre diet. It can also be easily implemented by clinical nurses in their everyday practice and used for local quality improvement projects with respect to developing the guidelines or guiding principles [31]. Kacmaz & Kasikci [44] suggested that with the help of non-pharmacological strategies such as increase physical activity, high fibre diet and fluid intake in preventing constipation. Most importantly, education about what constitutes “normal” bowel habits has been shown to be effective symptom management strategies for the older adults [44].

Limitations

There are several limitations of this study. Firstly, the limitations of the literature reviews are time constraints and the level of proficiency of the researchers who conducted the literature review thereby limiting the qualities of the literature reviews. The author needs to complete this dissertation assignment, which is a part time master's degree course in a given time frame with a full time job in Singapore. This dissertation assignment needs to be accomplished out with occupation time and hence it is not practicable to finish this research study in the research methodology requires primary data collection. In addition, the pressure of time frame may result in the literature review that is less wide-ranging and comprehensive. Therefore, the whole process of preparing the dissertation assignment did not go very well as what was expected. Secondly, the author is an apprentice researcher thus may evaluate the literature review and appraise the research summary in a less methodical as well as robust manner.

The author did not filter for relevant articles while searching for literature from databases using the keywords during the process initially. This has caused the author in spending more time in performing the same search from the databases. The selected articles were not critically appraised immediately from the databases resulting in spending too much time on manual search of each article. In retrospective, the author would have performed literature search, filtering and critical appraisal of the articles at one goal to save time. Furthermore, the author intends to summarize the key points for each of the articles that

have been selected after critical appraisal to serve as quick reference later. Therefore, the author has learned how to search for relevant literature from the well-established databases more efficiently by choosing appropriate keywords, how to organize the research articles better and how to organize and present the research results in a better flow. Furthermore, the evidence of the topic of constipation in the older adults has been well-established. Hence, there was difficulty in finding recent articles pertaining to this field of interest. Thus, many of the cited papers were noted to be dated years ago and the issue of whether the evidence was outdated or obsolete were evaluated. Most of these articles are considered relevant still although they were published around year 2000 as the scientific theory still suffice. Moreover, there are also insufficient published articles related to the topic found in the online databases. This could be due to the fact that relevant articles may have been missed through the filtering process in literature review as some of these articles may have valuable information relating to the topic but not stated in the abstract. In addition, many of the theories behind the concepts may have been long proven and hence no recent papers were written as controversies related to the topic were addressed prior to the creation of the database. Hence, there are only a few important articles with robust discussion regarding the chosen topic which had been presented repeatedly in the dissertation assignment. The reader may feel that the evidence is out of date. Nevertheless, the evidence reinforced on well-established facts and could contribute to the subsequent revision of lifestyle medication such as increase in fibre intake, physical activity and fluid intake in treatment of constipation in the older adults. Last of all, this is a narrative review without any meta-analysis and objective assessment in quantifying the impact of the previous studies cited, for which we could explore in future study.

Conclusion

The literature review summarizes and analyses the current available knowledge and understanding on the effect of lifestyle modification such as increasing fibre intake, fluid intake and physical activity in treatment of constipation in older adult. Constipation remains a challenging problem with only limited evidence on its management in the older patients [4]. Dietary management including increasing fluid and fibre still remains the most effective treatment for constipation [44]. Kalish & Loven [18] also emphasized that dietary, fluids and exercise modifications are recommended as first line treatments, followed by laxatives. In addition, the Registered Nurse Association of Ontario guidelines for constipation prevention in older adult population also recommend fluid and dietary fibre, regular exercise and consistent toileting [18]. Bosshardet al. [4] proposed the potential additive benefit of high fibre intake, fluid intake and physical activity in preventing constipation. However, it remains to be established whether these findings also apply in older populations when treating elderly patients with chronic constipation [4]. Unfortunately, there are only a few studies of sufficient methodological quality that tested these

general measures on increase fibre intake, fluid intake and physical activity in the treatment of constipation [4]. Leung et al. [31] also stated that it is indeed surprising that as a common condition found in at least one quarter of the older adults, constipation is treated in a wide variety of ways with relatively little evidence based data, especially regarding dietary fibre, fluids and physical activity. Thus, Kacmaz & Kasikci [44] demonstrated that perhaps the common practice of emphasizing high fibre diet, fluids and exercise especially for the older adults needs to be reconsidered. Furthermore, Rao and Go [38] suggested that more active recruitment of the elderly in clinical trials is in fact needed to provide better evidence based management of constipation in this population. Since the majority of the treatment protocols for managing constipation rely on preventive measures, such as increasing hydration, physical activity and high fibre diet in the older adults, it would seem important, especially for short term hospital stays, to attempt to identify elderly patients at risk of becoming constipated [50]. Consequently, Ross [52] also emphasized that the best practice for treating this problem of constipation is to adopt preventive measures. Last of all, as a clinical research associate (CRA) needs to make sure that the quality of the data is as high as possible by ensuring compliance with the clinical trial protocol, checking clinical site activities, making on site visits, reviewing case report forms, monitoring patients' notes for the study, performing products accountability and meeting with the site staff to discuss any issues [26]. Moreover, the responsibilities of a clinical research associate have to assure the protection of the rights, safety and well-being of human study subjects [26]. Additionally, clinical research associate also has to make certain that the scientific integrity of the data collected is protected and verified and assure that adverse events are correctly documented and reported [26] [52-59].

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