

Symptoms and Prevalence of Constipation among Adult Population of Riyadh City: An Internet Based Survey

Yazeed Abdullah Alhusainy¹, Ahmad Raed Tarakji², Nasser Yousef Alhowaish¹, Hussam Zaid Alorabi¹, Abdullah Abdulaziz Asebt¹, Hamad Sulaiman AlJutaili¹, Shabana Tharkar³

¹ College Of Medicine, King Saud University, ² Department of Medicine, College of Medicine, King Saud University, ³ Prince Sattam Chair for Epidemiology and Public Health Research, Department of Family and Community Medicine, College of Medicine, King Saud University.

Corresponding Author: Hamad Sulaiman AlJutaili, Email: haljutaili@gmail.com, Contact number: 00966569137255

ABSTRACT

Background: Constipation is commonly encountered in clinical practice. The global population is witnessing a rapid increase in its occurrence. **Objectives:** Since there is paucity of data in Saudi Arabia, there is a need to assess its prevalence in Saudi population. This study was performed as a pilot to determine the symptoms and prevalence of constipation among adult population of Riyadh city.

Materials and Methods: A questionnaire based cross sectional survey was done through twitter among Riyadh based accounts. The study was conducted among 388 adults older than 20 years, between November 2016 and January 2017. For the diagnosis of constipation three criteria were used; self-perception, Rome III and Bristol's criteria. **Results:** Our study showed that the prevalence of constipation in general population is 43%, 60% and 25% according to the three criteria, respectively. Females tend to have greater prevalence than males though not statistically significant. Multivariate analysis showed low dietary intake of fruits and vegetables, middle age (40-49 years), and strained defecation significantly associated with constipation. As per Bristol's criteria the most common stool form was Type 3 (sausage shaped with cracked surface).

Conclusion: These findings suggest high prevalence of constipation among Saudi population. A wider margin of variation in rates by the three criteria is obtained. **Limitation:** This twitter based survey may only be considered as a pilot study and is non-representative of general population.

Keywords: Constipation, Prevalence, Symptoms, Saudi adults.

INTRODUCTION

The modern lifestyle in terms of diet and physical activity has led to huge transition in the occurrence of diseases that has become more pronounced with the advent of the current century⁽¹⁾. Constipation is the commonest gastric disorder encountered in clinics⁽²⁾. Constipation is a disturbing symptom with lower quality of life. Chronic constipation poses serious health issues in terms of economic burden for both the patients and the healthcare systems^(3, 4). The prevalence of constipation has been on the constant rise worldwide⁽⁵⁾. It is still largely under-reported and complaint surfaces only with severe sickness^(6, 7).

Studies report wide variation in prevalence of constipation differing from one region to the other. A review published from European region reported prevalence with wide range between 1 and 81 % among thirty four populations of different ethnicity, race and country origin with a mean of 17%⁽⁸⁾.

Studies from western countries like Canada reported that chronic constipation affected nearly 2 to 27% of the Canadian population. While a recent cohort study reported 16 % overall prevalence in the United States^(3, 9). Asian studies from China, India and Japan

reported a prevalence of 8%, 17% and 28% respectively⁽¹⁰⁻¹²⁾. The factors associated with constipation in those studies were female gender, poor diet habits and lower socio economic status in addition to certain geographic regions, race and ethnicity. Such prevalence data on constipation are scarce in Saudi Arabia. One population based study trying to determine the irregularities of bowel function among Saudi adults showed that 18% of the respondents experienced abnormal bowel habits, but direct data on constipation was not enumerated⁽¹³⁾. Due to absence of uniform diagnostic criteria, there is a discrepancy in the reported rates. Bristol's chart and Rome III criteria are commonly used among the gastroenterologists to diagnose constipation^(14, 15) while some prefer using self-perception for constipation diagnosis in surveys^(7, 10). The present survey as a pilot to provide initial information on the topic, was carried out to study the symptoms of constipation and its risk factors among Saudi population based on the three criteria using internet as a mean of data collection.

METHODS

The study was conducted in the capital city Riyadh during the period between November 2016 and

January 2017. The study subjects included adults older than 20 years. Due to lack of published data on prevalence rates from this region, sample size for general population was calculated electronically through survey system⁽¹⁶⁾ considering the population size of 5.27 million⁽¹⁷⁾, 95% confidence interval and .05 confidence level with a precision of .03 as 384 subjects. A bilingual questionnaire (in Arabic and English) was used. The questionnaire was previously used in Saudi population by *Al Zubaidi et al.*⁽¹³⁾ and suitably modified according to the objectives of the present study. It consisted of consent section and questions on demographics, questions on dietary habits and physical activity, list of chronic illnesses, list of medications causing constipation and the three tools to assess the presence of constipation: self-perception, Rome III criteria and Bristol's chart (Table 1). Reliability analysis was done and Cronbach's alpha 0.653 was obtained. The question about quantity of daily intake of water showed poor correlation of .078 and Cronbach's alpha improved to .700 upon considering the item deleted. The questionnaire was pilot tested on twenty subjects and minor changes were adapted. These data from twenty subjects were not included in the final sample. The study was approved by the Institutional Review Board. Data collection was done using twitter survey method. The questionnaire was sent to subjects satisfying eligibility criteria from across different regions of Riyadh. Since internet based surveys reach out quickly to people and can recruit representative samples, we preferred to collect the data using the electronic web based internet technology. An informed consent was obtained prior to data collection and the questionnaire was self-administered by the study population. The data were then checked for completeness and entered into Microsoft excel and the statistical analysis was done using SPSS version 21.0. Percentages were used to report the prevalence rates. Chi-Square test was used to assess significant difference between categorical variables. Multivariate logistic regression analysis was performed to determine the variables associated with constipation. Definition of criteria used for diagnosis of constipation:

- (i) Self-reporting: constipation was recorded if patients responded affirmatively to bowel movements 3 times or less in a week or stools that are hard, dry and small making it difficult or hard to pass⁽¹⁸⁾.
- (ii) Rome III criteria: two or more positive responses is considered as constipation⁽¹⁹⁾:
 1. Straining during at least 25% of defecations
 2. Lumpy or hard stools in at least 25% of defecations

3. Sensation of incomplete evacuation for at least 25% of defecations
 4. Sensation of anorectal obstruction/blockage for at least 25% of defecations
 5. Manual maneuvers to facilitate at least 25% of defecations
 6. Fewer than 3 defecations per week
- (iii) Bristol's criteria: Type 1 and type 2 of the Bristol stool chart is indicative of constipation⁽²⁰⁾ (**Fig. 1**).

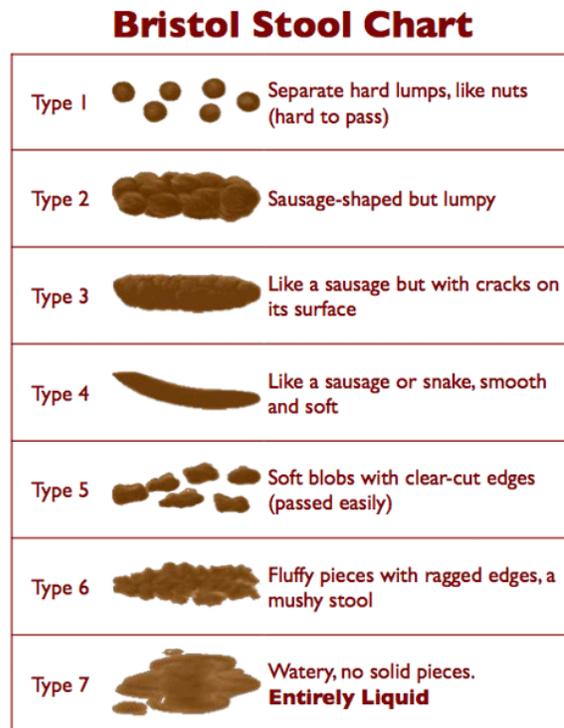


Figure (1): Bristol stool chart

The study was done after approval of ethical board of King Saud university.

RESULTS

Four hundred and seventy filled preforms were received. After thorough scrutiny for completeness of the questionnaire and after excluding the respondents who fell out of the inclusion criteria, 388 subjects were enrolled into the study. The socio-demographic details of the study subjects are shown in table (1). Females were slightly more than male subjects. Most of the respondents were young (under the age of 40 years) and majority had attained school or university education. The level of physical activity was low, as most of the study subjects were either sedentary (no intentional exercise) or had light activity (intentional exercise of 1-3 times per week).

Table (1): Socio demographic characteristics of the study population

| Total Respondents = 388 persons | | n (%) |
|---------------------------------|---------------------|-------------|
| Gender | Male | 181 (46.6%) |
| | Female | 207 (53.4%) |
| Age Group (Years) | 20-29 | 210 (54.1%) |
| | 30-39 | 53 (13.7%) |
| | 40-49 | 58 (14.9%) |
| | 50-59 | 53 (13.7%) |
| | ≥60 | 14 (3.6%) |
| Educational level | Illiterate | 0 (0%) |
| | Primary school | 1 (0.3%) |
| | Intermediate school | 9 (2.3%) |
| | High school | 56 (14.4%) |
| | University | 322 (83%) |
| Voluntary Physical activity | Sedentary | 94 (24.2%) |
| | Light | 174 (44.8%) |
| | Moderate | 92 (23.7%) |
| | High | 28 (7.2%) |

Table (2) shows the dietary habits, list of chronic illnesses and medication details. Generally the study subjects had higher meat consumption and the intake of fruits and vegetables was lower. Water intake of 80% of the study population was found to be less than the recommended six cups a day.

Table (2): Diet and Medical history of the population

| Total Respondents = 388 persons | | n (%) |
|---------------------------------|----------------------------------|---------------------------------|
| Diet | Daily fruit and vegetable intake | Yes: 162 (41.9%) |
| | | No: 226 (58.2%) |
| | Daily meat intake | Yes: 283 (73%) No: 105 (17%) |
| Daily water intake | Less than 6 cups a day | 302 (77.9%) |
| | More than 6 cups a day | 86 (22.2%) |
| Chronic Illnesses | Liver disease | 5 (1.3%) |
| | Thyroid disorders | 23 (5.9%) |
| | Diabetes | 38 (8.2%) |
| | Hypertension | 28 (7.2%) |
| | IBS | 55 (14.2%) |
| | Chronic kidney disease | 0 (0%) |
| | Heart disease | 7 (1.9%) |
| | GI surgery | 19 (5%) |
| | Medications | Laxatives |
| Thyroid supplement | | 18 (4.6%) |
| Iron Supplement | | 31 (8%) |
| Calcium Supplement | | 25 (6.5%) |
| Herbal laxatives | | 21 (5.4%) |
| Calcium Channel Blockers | | 0 (0%) |
| Diuretics | | 0 (0%) |

The type of stools is described in figure (2). The predominant stool type was sausage type stools with cracked surfaces on the edges (type 3 of Bristol's chart). A total of 25% of our study population had symptoms of constipation categorized as Type 1 and 2 by Bristol's chart.

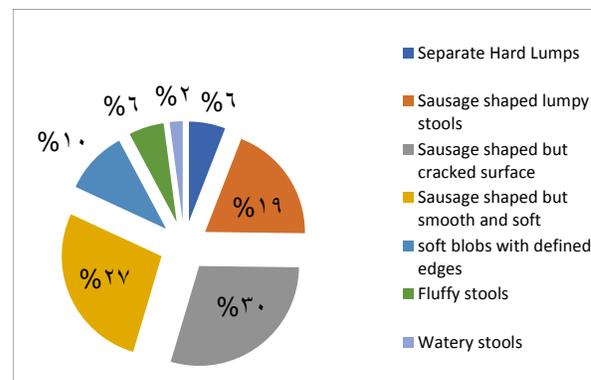
**Figure (2): Types of stools**

Figure (3) shows the frequency of different symptoms according to Rome III criteria. Approximately half of the subjects strained during defecation or had lumpy hard stools with sensation of incomplete evacuation indicative of constipating symptoms.

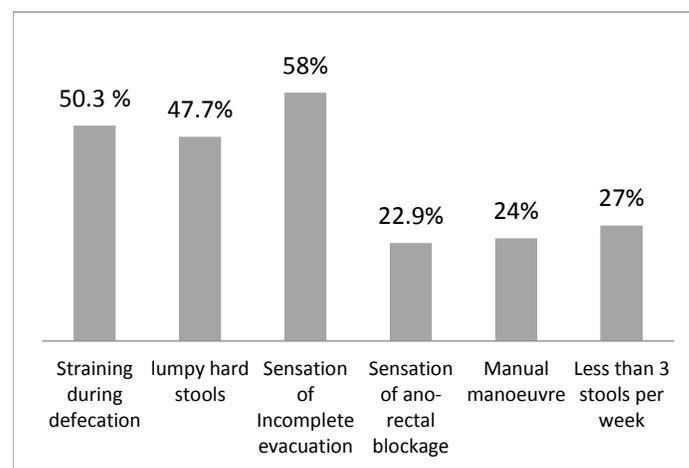
**Figure (3): Frequency of different symptoms according to Rome III**

Table (3) demonstrates the prevalence data. Overall 43% of the study population was categorized to have constipation according to self-reported perception. Nearly 60% of the respondents showed signs of constipation according to Rome III, but in contrast only 25% reported to have been suffering from constipation according to the type 1 and 2 of Bristol's chart. Females showed higher prevalence though not significant in all 3 types of diagnostic criteria.

Table (3): Overall and gender wise prevalence rates of constipation by 3 criteria

| Criteria | Total Population (388) n (%) | Male (181) n (%) | Female (207) n (%) | P value |
|--------------------|---------------------------------|---------------------|-----------------------|---------|
| Self-reporting | 166 (42.8%) | 73 (40.3) | 93 (50%) | 0.296 |
| Rome III criteria | 235 (60.6%) | 102 (56.4%) | 133 (64.3%) | 0.117 |
| Bristol's criteria | 98 (25.2%) | 45 (24.9%) | 53 (25.6%) | 0.279 |

Table (4) describes the significant variables associated with constipation. Multivariate analysis for constipation as dependent variable was done separately for all the three criteria. Low dietary intake of fruits and vegetables and age group 40-49 years was significantly associated with constipation diagnosed by Bristol's criteria and self-perception, while straining during defecation was associated with constipation by all three methods.

Table (4): Multivariate analysis showing factors associated with constipation in general population for self-reporting, Bristol's and ROME III criteria.

| Significant variables | β Coefficient | Odds ratio | p value |
|------------------------------------|---------------|------------|---------|
| Constipation (Bristol's criteria): | | | |
| Age (40-49 years) | .879 | 2.4 | .03 |
| Less fruit/vegetable in diet | .857 | 2.3 | .002 |
| Straining during defecation | 1.5 | 4.6 | .001 |
| Constipation by self-reporting: | | | |
| Age (40-49 years) | -1.1 | .33 | .03 |
| Less fruit/vegetable intake | -.706 | .494 | .025 |
| Straining during defecation | -3.8 | .022 | .001 |
| Constipation(ROME III criteria): | | | |
| Straining during defecation | 5.9 | 3.8 | .001 |

Other independent variables included in the equation were socioeconomic status, education status, daily meat intake, daily water intake, prevalence of chronic illness like liver and thyroid diseases, diabetes, hypertension, heart diseases, GI surgery and medications like Thyroid replacement, laxatives, iron supplement, calcium supplement, Calcium channel blockers, Sevalamer and diuretics.

DISCUSSION

The study assessed the status of symptoms of constipation among the Saudi population. Constipation have been not well defined nor did it have a gold standard method of diagnosis⁽²¹⁾. Constipation is usually subjective and is termed when people have reduced frequency of stools or strain during defecation⁽¹⁵⁾. Hence there are many clinical diagnostic criteria for constipation resulting in huge variation in its prevalence⁽²²⁾. The present study obtained a self-reported prevalence rate of constipation as 42.8% in the general population. On application of the Rome III criteria, the rate increased to 60%, while estimation through the Bristol stool chart obtained a lower rate of 25.2%.

These statistics show marked variation. However, since there is no single gold standard diagnostic method available, there is a need to discuss the pros and cons of the other methods used. Every method has its own strengths and limitations. Self-reporting method is especially individual based and depends on the extent of the self-perception of people in the frequency of stools and the amount of straining depending on one's bowel habits as reference standard. Hence, there is a risk of over reporting the symptoms although it might be considered to be normal resulting in overestimation of results. There is a need to highlight the ambiguity in difference in the prevalence rates that might relate to the differences in self-perception. Such discrepancies have also been reported by other studies earlier⁽⁷⁾. Johanson in his review of epidemiology of constipation demonstrated a prevalence ranging from 3% to 27 %, mostly from NHS and NHANES surveys using either self -reported or Rome I /II criteria and thereby attributed the variance to the different diagnostic criteria and concluded by stating self-reporting method has a risk of attaining higher prevalence rates⁽²³⁾. But in our study, the prevalence rate was the highest by Rome III

criteria. Incomplete evacuation, straining during defecation and lumpy stools were the three symptoms of Rome III chart that were most predominantly quoted by the study subjects. A combination of these three responses by itself has reached beyond the 50% rate leading to meeting the criteria for the diagnosis. There is every probability that the individuals might had difficulty in understanding the definition stating 'in at least 25% of the occasions' for questions of Rome III criteria. The inability to accurately quantify and assess the symptoms for three months would have led to assumptions of positive responses. Moreover, the bias introduced by self-administration of questionnaire through internet based survey cannot be ruled out. The diagnosis of constipation by Bristol's criteria has shown lower rates of prevalence compared to the other 2 criteria in the current study. These findings necessitate future larger well designed epidemiological studies using trained interviewer administered questionnaire for sustainability and reliability of results using the different diagnostic criteria. Needless to say there is a need for formulation of consensus in Saudi Arabia for arriving at a suitable method for diagnosis of constipation by validating its diagnostic accuracy through sensitivity, specificity and predictive values.

Etiological causes of constipation are numerous and may result from neurologic causes, myopathic disorders, mechanical obstructions due to benign/malignant growth, hormonal disorders, drug-induced, diet-related or simply idiopathic⁽⁶⁾. Epidemiological studies have identified several environmental risk factors for occurrence of constipation. The un-modifiable risk factors like female gender and increasing age and modifiable risk factors like, low fiber diet, lower levels of physical activity, lower socioeconomic status and low levels of education and living in cold places have been well-known⁽²⁴⁻²⁶⁾. Our findings are also suggestive of female gender, age and low dietary intake of fresh fruits and vegetables. The high meat consumption as we observed in our study is reflective of the poor dietary pattern. Besides, our findings showed that those who had lower intake of fruits and vegetables in daily diet were at 2.3 times the risk to develop constipation. Fibreless diet in combination with increased daily meat intake and decreased water consumption which have been identified in the present study may prove deleterious in other functional disorders as well. These findings highlight the need for extensive study of the diet habits and identification of the underlying risk associated with it. Since studying

the etiological and environmental factors in detail was beyond the scope of the study, we suggest that the future research may target identification of these risk factors among the Saudi population. Association of constipation with female gender is also well established in literature⁽²⁴⁾. Females in US were reported to be 2.2 times more likely to suffer from constipation than males⁽²⁷⁾. However, it is difficult to establish the exact causative mechanism, but contributing factors like hormonal causes and dietary pattern have been elucidated^(28, 29). The present study has also reported an inclination towards higher prevalence rates among females. Such similar findings were enumerated by several studies from different regions like Europe, US, Asian and Australian regions marking the homogeneity in the expression of the disorder despite of the geographic and genetic variations^(7, 8, 27).

CONCLUSION

Our study demonstrated a high prevalence of constipation. In addition to such high rates, the risk factors related to constipation have been identified among the Saudi population. Saudi Arabia is markedly deficient in literature citing constipation prevalence and determinants. This may initiate a call for setting priority as one of major public health issues and deserves urgent attention both at clinical and at community level. In depth dietary assessment needs to be undertaken in order to determine the role of diet on the disease pattern. The findings of this study have important implications on future research. It has highlighted the magnitude of the disorder and has provided a pathway for designing larger population based studies to assess its epidemiology, etiological characteristics, environmental risk factors and the quality of life of people with constipation. We acknowledge certain gross limitations in the study. The undertaking of internet based twitter survey, self-administered questionnaire, recall bias of foods consumed, non representativeness of the study population, non generalizability of results to larger population are some of the limitations of the study. However this twitter survey can be enumerated as first of its kind in Saudi Arabia serving as a pilot to provide initial statistics about constipation from which future studies can be planned.

Conflict of interest: The authors declare no conflict of interest

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