

## LIFESTYLE MODIFICATION AND BOWEL MOVEMENT

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### ABSTRACT

**Introduction** There are rising cases of colorectal cancer world-over including the United States, Nigeria and Canada, and all cases arose from habit with only 7.5% of the cases inherited. **Objectives** To examine the impacts of habit and lifestyle modification on optimum bowel movement. Purpose is to reduce the risk of constipation and associated diseases. **Methods** A quantitative study designs involving adapted 28-item MEDLIFE index structured questionnaire was used to determine the lifestyle, and bowel movement history of participants. Pre-test bowel movements characteristics were measured. Sample size  $n$  ( $n = 10$ ) participants. The baseline pre-test data collection, and the results of the Questionnaire analysis were analyzed and discussed in synthesis with the literature. SPSS Statistical analysis was performed. Linear regression and Spearman rank correlation was adopted for questionnaire analysis and ANOVA used to examine the within and between treatment sessions' means. Tukey HSD was used to determine significance differences. Relationship and direction of causation was determined by regression analysis. Results :at 5% error margin, and at 95% Confidence interval, there was a significant inverse relationship between water consumption and the amount of time taken to empty the bowel. ( $P < 0.05$ ). Conclusion. There was a relationship between water consumption and bowel movement and bowel emptying time. Exercise, fruits and vegetables showed slight impact but not significant.

**Keywords:** Lifestyle Modification, Bowel movement, constipation, constipation and colorectal cancer.

### INTRODUCTION

In any given population, the risk of colorectal cancer in an individual's lifetime is averagely five-point five percent (5.5%) (1) Physicians suggest that in determining the cause of constipation there is a need to consider the general health of the patient, namely, dietary fibre intake, other medical illnesses, constipation medication usage, and psychosocial status of the patient (2). Constipation is having difficulty with digestion, and movement of feces out from human rectum. It affects the size, consistency, frequency, and how long it takes to move the bowel while in the toilet (2). Constipation occurs when digested products are not evacuated completely or infrequently from the intestinal canal, and it often delays expulsion of feces from the intestine (3) The colon is the part of the alimentary canal where all undigested food is stored, and it is the place where the largest volume of water, as well as the remaining digested food not absorbed in the small intestine are absorbed (4).

When an individual consumes low fibre diets over a long time, the colon degenerates and develops what is called polyps, some are carcinogenic and some are not (4, 5). The risk factors identified with colon cancer are: unhealthy eating namely, red meat consumption more than three times per a week, deep frying, no or poor exercise, overweight/obesity, tobacco consumption and alcohol abuse (6, 7). Colon cancer can also be genetically related when inherited (1) and it is associated with constipation.(8) In Canada, excluding skin cancer, colorectal cancer ranks second among the most frequently diagnosed cancer (9,10) Constipation exerts negative impact on people's quality

of life as a standalone disease and as diseases co-morbidity. In the United States, as many as 2.5 million clinical visits were caused by constipation (2). The prevalence of constipation in Nigerian general population is 20%, more prevalence among elderly population, than everyone else, and it is a significant cause of illnesses (11,12,13,14,15). Therefore, there is need to prevent constipation and poor bowel movement. A 28-item MEDLIFE index was adapted and the questionnaire was used to investigate the history of the participants' food habit and physical activities. Participants were asked to record their bowel movement characteristics and time taken to move the bowel during the 2-week exercise.

And literature is scanty on relationship between lifestyle modification and bowel movement, therefore, this study examined the history of the participants' food habit, physical activity and bowel movement history for two weeks. This study did not determine whether efficient bowel movement could lower the risk of colon cancer and other co-morbidity diseases but rather the impact of eating habit and lifestyle on constipation and bowel movement. Reduction in constipation of people across age demographics can reduce other conditions co-morbid with constipation, and add value to constipation, and colon cancer literature. And that can be a social change implication of this study outcome. The general public, patients, researchers, healthcare service providers, public health practitioners, and policy makers stand a chance to benefit from the outcome of this study.

### METHODOLOGY

This was a quantitative design survey. We used 28-item MEDLIFE questionnaire adapted to Nigerian socio-cultural lifestyle to collect data on participants eating habit, lifestyle and water intake, as well as their bowel movements pattern and we examined the relationship between intake of fibrous food (fruits and vegetables) and physical

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activities on bowel movement. Also, we involved grounded theory approach because we examined relationships, similarities and made comparisons of participants' lifestyles and bowel movement and compared outcome of questionnaire and the base-line bowel movement characteristic as recorded by each participants whom we instructed to visit the toilet for a bowel movement and record the characteristics. Characteristics of stool recorded by participants included; formed, hard, scattered, complete or incomplete movement. Since, our goal in this study was to learn the lifestyles and food habit of the participants' impacts on their bowel movement, Logic Theory supported this study method of data collection.

The quantitative samples size  $n$  ( $n=10$ ) participants recruited from Nigerian population with obesity and overweight and at least one existing chronic disease. Participants were 18 years old and older and less than 65 years old. Any person who showed interests but did not meet the conditions of inclusion were excluded from participating, and so 40 persons initially registered for the study was screened down to ten to meet inclusion criteria. Each participant received MEDLIFE Questionnaires and completed it. The journal to record the characteristics of their bowel movement was filled by each participant also. We taught participants how to complete the questionnaire and record their bowel movement. The questionnaire data and journal records kept was (were) analyzed using SPSS version..... We analyzed only the completed questionnaire of each participant using linear regression Models and Spearman rank correlation. We required each participant to visit toilet for bowls movement and we analyzed the participants' bowel movement in synthesis with the result, the analysis of the participants eating habit and lifestyle data obtained from the completed questionnaire.

## RESULTS.

### Analysis of the Mediterranean Lifestyle index (MEDLIFE) questionnaire on Fibrous Food Intake and Bowel Movement

Results obtained showed there was no significant ( $p>0.05$ ) difference between fibrous food consumption and bowel movement, although there was slight difference. Also, there was no significant ( $p>0.05$ ) difference between physical activities and bowel movement; however, there was a slight difference (Table 1). From the MEDLIFE index items grouped into three blocks comprising food consumption, dietary patterns, and physical activity is shown in Table 1. The number of participants that received a maximum score of one point for each item is presented in percentages. In the first block, 'Mediterranean food consumption,' only one participant (10.0%) met 1-point criteria ( $<2$  servings/week) for red meat, two (20.0%) fruits (3–6 servings/d), three (30.0%) scored 1 -point for tomatoes ( $\leq 2$  s/day). However, all the participants scored 1-point for herbs, spices, and garnish ( $\geq 1$  serving/d), 90% met the criteria for processed meat ( $<2$  servings/week), legumes and Fish/seafood ( $\geq 2$  servings/week), 60%, and 80% met criteria for vegetables ( $\geq 2$  servings/d) and vegetable oil ( $\geq 3$  s/day) (Table 1).

For Mediterranean dietary habits in block two, none of the participants met the 1-point criteria for wine and palm wine (1–2 servings/d), whereas all met the criteria for water infusions (6–8 servings/d or  $\geq 3$  servings/week), snacks ( $\leq 2$  servings/week), limited sugar in beverages and seasonal and traditional local foods/products, 70% met criteria for white-grain cereals and food moderation (Table 1). All participants (100.0%) met the 6-8 hours daily sleep requirement, 90 for siesta/nap, 70% met the requirement for physical activity. In contrast, only 10% and 20% met the criteria for Socializing with friends ( $\geq 2$  h/weekend) and time of launch ( $\geq 20$ mins) respectively. (Table 1).

**Table 1: The Mediterranean Lifestyle index (MEDLIFE) questionnaire**

Item	Mediterranean Lifestyle Index (MEDLIFE) Questionnaire	Criteria for 1 point*
1	How many servings of Pastries do you eat every week? (Candy (1s=1 unit or 50g), chocolates (1 s=30g), biscuits, (1 s=4-6 units), Nougat, snacks-meat-pie, fish-pie, meat roll, fish roll, chicken pie, doughnut, Chim-Chim (1 s=40g))	$\leq 2$ s/week
2	How many servings of red meat do you eat every week? (Beef, pork, goat, lamb, bush meat (1 s =100-150 g))	$< 2$ s/week
3	How many servings of processed meat do you eat every week? (Ham (1 s=1 slice or 30 g), sausage, soft spicy sausage, bacon (1 s=50 g), hamburger 1 s=1 unit), liver (1 s=100-150 g), Pathe (1 s=25 g))	$\leq 1$ s/week
4	How many eggs do you eat every week? (Eggs (1 egg))	2-4 s/week
5	How many servings of legumes do you eat every week? (Beans, peas, chickpeas, Lentils, Bambara beans (1 s=1 plate or 150 g))	$\geq 2/$ week
6	How many servings of white meat do you eat every week? (Birds, poultry, turkey, rabbit (1 s=100-150 g))	2 s/ week
7	How many servings of seafood portions do you eat every week? (White fish, oily fish like sardines, ice fish, tuner, mackerel (1 s=100-150 g), canned fish, 1 s=1 can, or 50 g), seafood (crayfish, shrimps, prawn, crab, lobster 1 s=200 g)	$\geq 2/$ week
8	How many servings of Yam or sweet potatoes do you eat every week? (Boiled, fried/roasted yam (1 s=100-150 g))	$\leq 3$ s/week
9	How many servings of plantain do you eat every week? (Roasted/boiled/fried,(1 s=150-200 g))	$\leq 3$ s/week
10	How many low fat dairy do you drink in a day? (milk and milk products) (liquid milk, evaporated milk, powdered milk, full cream yoghurt 1 s=200 ml, two yoghurts, and 1 portion of soft cheese))	2 s/day
11	How many nuts do you eat every day? (Palm kernel, coconut, groundnut (peanut), almonds, walnuts, hazelnuts,(1 s=handful, or 30 g), olives, palm fruits (1 s=10 units	1-2 s/day
12	How many times do you herbs, spices, and garnish for cooking every day? (Green tete, pumpkin leaves, parsley, oregano, and green leafy vegetables, onion, garlic, ginger, oziza, ehuru, uda, cinnamon, nutmeg	$\geq 1$ s/day
13	How many fruits do you eat every day? (All kinds of fruits and fresh-fruit based juices (1 s = 150-200g))	3-6 s/day
14	How many servings of vegetables do you eat every day? (All kinds of fruits and fresh-fruit based juices (1 s=150-200 g))	$\geq 2$ s/day
15	How many tablespoons of olive oil or pure palm oil do you eat (use for cooking, or salad dressing (Olive oil, virgin olive oil, or pure unadulterated palm oil from Nigeria, African or tropical countries, fish oil, cod liver oil,.) (1 s= 1 tablespoon))	$\geq 3$ s/day
16	How many tablespoons of groundnut or vegetable oil do you eat (use for cooking, or salad dressing (Groundnut oil, vegetable oil, maize oil, sunflower oil, canola oil) (1 s= 1 tablespoon))	$\geq 3$ s/day
17	How many servings of cereals do you eat in a day? (White and whole-grain bread (1 s=40 g), Cereals (1 s=1 plate of rice, pasta or 40 g breakfast cereals e.g. Cornflakes,	3-6 s /day

	oatmeal or Quaker oats, akamu (pulp), custard, and food made from cereal (cereal derivatives)	
18	How tomatoes of tins of tomatoes do you eat in a day? (1 s=tin=50g)	≤ 2 s/day
<b>Block 2: Mediterranean Dietary Habits</b>		
19	Do you drink more than 6 glasses of water every day? (1 s= 1 glass)	Yes
20	Do you drink at least one cup of tea or coffee every day? (1 s= 1 cup)	Yes
21	Do you drink wine during the meals every day (White/red wine (1 s=1 glass of wine)	1-2 s/ day
22	Do you drink Palm wine every day? (Palm, and raphia palm wine (1 s- 1 glass of wine	Yes
23	Are your meals often low, or moderately, or too salty, last limit?	Low
24	Do you usually use whole-grain products (bread, pasta, rice, breakfast cereals)	Yes
25	Do you usually use white-grain cereals products (white bread, white pasta, polished rice, white breakfast cereals)	Yes
26	Do you eat 2 or less snacks every week (potatoes chips, tortilla, plantain chips, popcorn, processed packaged dry meat- beef jerks, etc.,	Yes
27	Do you limit your nibbling in-between meals?	Yes
28	How many in-between meals do you eat in a week?	≤3/week
29	Do you limit your beverages? (Including pop, sugar-sweetened beverages, coke, Fanta, sprite, Pepsi drinks etc. )	Yes
30	How many beverages do you take in a day? (Including pop, sugar-sweetened beverages, coke, Fanta, sprite, Pepsi drinks etc.)	≤3/week
31	Do you prefer and eat seasonal and traditional local foods/products, fresh and minimally processed food?	Yes
32	Do you prefer and eat with moderation, trying to choose small portion sizes?	Yes
<b>Block 3: Physical Activity: Rest, Social Habits and Conviviality</b>		
33	Do you engage in physical activity (>150 min/week or 30 min/day)? (Jogging, walking preferably fast walking, dancing, aerobics and gardening, cleaning, house or yard work))	Yes
34	Do you sleep siesta/nap/rest in your bed?	Yes
35	How many hours do you sleep every day (averagely) (during week days)?	6-8 hours
36	How many hours do you spend watching TV every day? (During weekdays)?	≤ 1hour/ day
37	How many hours do you spend going out with friends during your free time (e.g., weekends)?	≥ 2hour/ weekend
38	How many times do you practice team sports in a week?	≥ 2hour/ week
39	How much time do you spend having lunch during week-	≥ 20min

	days?	
40	Do you usually eat in company (With family, friends, and colleagues)?	Yes
	Valid	40 points

**Table 2: Mediterranean Lifestyle (MEDLIFE) Index, Score Distributions And Correlations Among Study Participants and Food Type Intake (N=10)**

Food group	Foods included	Criteria for 1 point*	n	%	Spearman rank P
<b>Block 1: Mediterranean food consumption</b>					
1. Sweets	Candy (1 serving = 1 unit or 50 g), chocolates (1 serving = 30 g), biscuits (1 serving = 4–6 units), turrón (1 serving = 40g)	≤2 servings/ week	5	50.0	0.774
2. Red meat	Beef, pork, lamb (1 serving = 100–150 g)	<2 servings/ week	1	10.0	0.873
3. Processed meat	Ham (1 serving = 1 slice or 30 g), sausage, soft spicy sausage, bacon (1 serving = 50 g), hamburger (1 serving = 1 unit), liver (1 serving = 100–150g), pâté (1 serving = 25g)	≤1 serving/ week	9	90.0	0.416
4. Eggs	Eggs (1 egg)	2–4 servings/ Week	7	70.0	0.754
5. Legumes	Lentils, beans, peas, chickpeas (1 serving = 1 plate or 150 g)	≥2 servings/ week	9	90.0	0.244
6. White meat	Poultry and rabbit (1 serving = 100–150 g)	2 servings/ Week	4	40.0	1.000
7. Fish/ seafood	White/oily fish (1 serving = 100–150 g), canned fish (1 serving = 1 can or 50 g), seafood (1 serving = 200 g)	≥2 servings/ week	9	90.0	0.416
8. Yam or Potatoes	Roast/boiled potatoes, French fries (1 serving = 150–200 g; Boiled, fried/roasted yam 1 s=100-150 g)	≤3 servings/ week	6	60.0	0.426
9. Plantain	Roasted/boiled/fried (1 serving =150-200 g)	≤3 servings/ Week	9	90.0	0.631
10. Low-fat dairy products	Skimmed dairy milk (1 serving = 1 cup or 200 ml), soft cheese	2 servings/d	7	70.0	0.147
11. Nuts and olives	Walnuts, almonds, hazelnuts (1 serving = 1 handful or 30 g), olives (1 serving = 10 units)	1–2 servings/d	7	70.0	0.458

12. Herbs, spices and garnish	Onion, garlic, herbs (parsley, oregano)	≥1 serving/d	1 0	100.0	-
13. Fruit	All fruit and fresh fruit-based juices (1 serving = 150–200 g)	3–6 servings /d	2	20.0	0.631
14. Vegetables	All vegetables except potatoes (1 serving = 150–200 g)	≥2 servings /d	6	60.0	0.462
15. Palm oil	1 serving = 1 tbsp	≥3 servings /d	6	60.0	0.219
16. Groundnut or vegetable oil	Groundnut oil, vegetable oil, maize oil, sunflower oil, canola oil (1 s = 1 tablespoon)	≥ 3 s/day	8	80.0	0.631
17. Cereals	White and whole grain bread (1 serving = 40 g), cereals (1 serving = 1 plate) and derivatives	3–6 servings /d	5	50.0	0.189
18. Tomatoes	Tomatoes tins or tomatoes (1 s=tin=50g)	≤ 2 s/day	3	30.0	0.230
<b>Block 2: Mediterranean dietary habits</b>					
19. Water or infusions	Water or infusions (1 serving = 1 glass)	6–8 servings/d or ≥3 servings/Week	1 0	100.0	-
20. Tea or coffee	Tea or coffee (1 serving = 1 cup)	Yes	3	30.0	0.044
21. Wine	White/red wine (1 serving = 1 cup)	1–2 servings /d	0	0.0	-
22. Palm wine	Palm, and raphia palm wine (1 serving = 1 glass of wine)	1–2 servings /d	0	0.0	-
23. Limit salt in meals		Low salt	6	60.0	0.002
24. Preference for whole grain products	Bread, pasta, rice, breakfast cereals	Yes/fibre > 25 g/d	7	60.0	0.426
25. White-grain cereals	White bread, white pasta, polished rice, white breakfast cereals	Yes	7	70.0	0.458
26. Snacks	Potatoes chips, popcorn (1 serving = 1 bag or 50 g)	≤2 servings /week	1 0	100.0	-
27. Limit nibbling between meals	Nibbling outside five main meals	Yes	9	90.0	0.122
28. In-between meals		≤3/week	3	30.0	0.917
29. Limit sugar in beverages	Sugar-sweetened beverages	Yes	1 0	100.0	-

30. Beverages	Including pop, sugar-sweetened beverages, coke, Fanta, sprite, Pepsi drinks etc.	≤3/week	1	90.0	0.122
31. Seasonal and traditional local foods/products	Fresh and minimally processed food	Yes	1 0	100.0	-
32. Food moderation		Yes	7	70.0	0.917
<b>Block 3: Physical activity, rest, social habits and conviviality</b>					
33. Physical activity	(>150 min/week Jogging, walking quickly, dance, aerobics, gardening or 30 min/d)	Yes	7	70.0	0.599
34. Siesta/nap	During weekends	Yes	9	90.0	0.122
35. Hours of sleep	During weekdays	6–8 h/d	1 0	100.0	-
36. Watching television	During weekdays	≤ 1 h/d	5	50.0	0.924
37. Socializing with friends	During weekends	≥2 h/weekend	1	10.0	0.122
38. Collective sports	During week	≥2 h/week	0	0.0	-
39. Time of lunch	During weekdays	≥20mins	2	20.0	0.324
40. Eat in company	With family, friends, and colleagues	Yes	5 0	50.0	0.631

### Fibrous food with bowel movement

As shown in Table 3, participants that met the criteria for vegetables (≥ 2 s/day) had a slightly better bowel movement ( $2.48 \pm 0.97$ ) than those who did not ( $2.38 \pm 0.11$ ) ( $P = 0.527$ ). Also, times taken for bowel emptying among participants that met criteria for vegetables were slightly shorter  $4.01 \pm 0.28$  and  $3.91 \pm 0.23$  than those that did not meet the criteria  $4.30 \pm 0.43$  and  $4.96 \pm 0.04$  respectively ( $P > 0.05$ ).

**Table 3: Fibrous food with bowel movement**

Fibrous food	1 point	0 point	P-value
Vegetables	$2.48 \pm 0.97$	$2.38 \pm 0.11$	0.527
Fruits	$2.35 \pm 0.10$	$2.46 \pm 0.08$	0.547
Nuts	$2.43 \pm 0.09$	$2.46 \pm 0.14$	0.893
Tomatoes	$2.48 \pm 0.05$	$2.42 \pm 0.10$	0.716

Mean ± SEM

**Table 4: Time For Bowel Movement with Fibrous Food**

Fibrous food	1 point	0 point	P-value
Vegetables	4.01 ± 0.28	4.30 ± 0.43	0.571
Fruits	3.55 ± 0.227	4.27 ± 0.73	0.227
Nuts	4.18 ± 0.26	4.00 ± 0.56	0.741
Tomatoes	4.09 ± 0.53	4.14 ± 0.27	0.925

Mean ± SEM

**Bowel movement and Time taken for Bowel emptying with Physical Activities**

Participants who met the physical activity criteria showed higher bowel movement than those that did not (Table 5). Participants that engaged in physical activity (30mins a day/150 mins weekly) had a slightly shorter bowel emptying time 4.11 ± 0.29 than those who did not (P = 0.915). Also, those that sleep/siesta/nap/rest and those that spend ≥ 2hour/weekend going out with friends during their free time had slightly shorter bowel emptying times 4.08 ± 0.25 and 4.37 ± 0.77 than those that did not (P = 0.615).

**Table 5: Bowel movement and Time taken for Bowel emptying with Physical Activities**

Physical activities	1 point	0 point	P-value
Engage in physical activity (30mins a day/150 mins weekly)	2.43 ± 0.08	2.47 ± 0.15	0.782
Sleep/siesta/nap/rest in your bed	2.41 ± 0.07	2.75 ± 0.00	0.150
Watching TV for ≤ 1hour/day per day	2.34 ± 0.10	2.54 ± 0.09	0.169
Spend ≥ 2hour/weekend going out with friends during your free time	2.42 ± 0.00	2.44 ± 0.08	0.927
Spend ≥ 20min having lunch during weekdays	2.17 ± 0.09	2.51 ± 0.06	0.039*
Usually eat in company	2.37 ± 0.11	2.51 ± 0.09	0.369

**Time taken for bowel emptying with physical activities**

Physical activities	1 point	0 point	P-value
Engage in physical activity (30mins a day/150 mins weekly)	4.11 ± 0.29	4.17 ± 0.43	0.915
Sleep/siesta/nap/rest in your bed	4.08 ± 0.25	4.50 ± 0.00	0.615
Watching TV for ≤ 1hour/day per day	4.43 ± 0.38	3.82 ± 0.20	0.196
Spend ≥ 2hour/weekend going out with friends during free time	4.08 ± 0.00	4.13 ± 0.77	0.851

Spend ≥ 20min having lunch during weekdays	4.37 ± 0.77	4.06 ± 0.75	0.616
Usually eat in company	4.20 ± 0.35	4.05 ± 0.73	0.767

**DISCUSSION/CONCLUSION**

This quantitative objective study was drawn from the results of the answers supplied by participants that completed MEDLIFE Questionnaire adapted to Nigeria socio cultural and lifestyle, and pre-test or baseline bowel movement record of all participants and the optimum water consumption and optimum bowel movement (2000 ml/day) as determined in the published article in second phase of this study. It involved quantitative methods. The conclusion was based on the outcome of MEDLIFE questionnaire about bowel movement-, water intake-, food habit-, and physical activity histories in synthesis with the actual bowel movement journal of each participant of the pre-test data prior to the water treatment intervention that we conducted in a published article of the water treatment brief report. The participants who met the criteria for consuming medium to high quantity of fibrous food and engaged in physical activities showed slight improvement but not significant at moving the bowel and the time taken (to empty the bowel was slightly short.

However, those who consumed optimum water intake showed significant bowel movement and the time taken to evacuate the bowel was shortest, and those who consumed low or no quantity of fibrous food and low quantity of water revealed poor bowel movement, incomplete evacuation, hard formed and longer time was taken to move the bowel. The studies of (6,16,17) agree with this findings. Because there was a relationship between water consumption and bowel movement, null hypothesis one (HO1) was rejected and alternate accepted because there was a relationship. There was an inverse relationship between water consumption and the amount of time taken to empty the bowel thus, null hypothesis two (HO2) was rejected and alternate accept. While there was slight impact of fruits and vegetable consumption as well as physical activity engagement on bowel movement, it was not significant thus, there was no relationship between those variables and optimum bowel movement. This result was in congruence with the study of (18, 19, 20). It is worthy of mention that all participants live in tropics where the heat of sun is very high causing people to constantly taste for water. So, the participants that consumed up to 1500 - 2000 ml prior to the intervention revealed a pre-test bowel movement that was good and significant (p-value < 0.001\*). Optimum consumption of 2000 ml of water or more per day showed a significant positive effect on bowel movement (p-value < 0.001\*) thus, there is a direct independent relationship between optimum water consumption and healthy bowel movement (21). This outcome was supported by many other previous authors including (3), that suggested that taking two or more glasses of water during meals helps to prevent constipation.

**Recommendations.**

More studies may be necessary essentially on a large scale with large sample size to support or debunk the findings.

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