

Overview and causes of pica disorder biology essay



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Pica Disorder is the affliction that causes people to have a sudden urge to consume non-food related items (1). This disorder has baffled scientist for decades, and research has yet to come up with a clear reason or cause (1). Pica disorder can be found in literature as early as Hippocrates, and has been classified by many ancient scholars during the middle ages and Renaissance times (1). Many explorers, missionaries, and colonist have also written accounts about pica disorder in their journeys (1). Many of these early descriptions placed pica disorder as an intense desire to consume non-food related items, and has been described as a cultural phenomenon with no physiological cause(1). The word pica comes from the Latin word Pica pica which is the name of the magpie, a bird that is described to have an erratic appetite (1). Other names include cachexia Africana (named by doctors who took care of the African slaves), citta, mal d'estomac, and malacia (1).

Pica disorder is prevalent among pregnant women and young children because they are the most biological vulnerable, and can also be found in people that are undergoing renal dialysis, have celiac disease, and those who have a red blood cell defect such as sickle cell anemia (1). The disorder can cause many different affects on the body with both positive and negative results (1). Some negative effects include: metal poisoning, damage to internal organs, and some weight gain (1). Positive effects may include: providing important micronutrients that the body lacks (Fe, Ca, or Zn), possible relieving stress on the gestational tract, and preventing harmful pathogens and bacteria from entering the blood stream (1). Several explanations have been provided to explain what causes pica disorder such

as: psychological stress, dyspepsia, general hunger, protection against toxins and pathogens, and a side effect of iron deficiency which can cause anemia (1).

In medical literature the definition of pica is, “ the craving and purposive consumption of substances that the consumer does not define as food with symptoms lasting longer than one month.” (1). This clarification indicates that pica cannot be classified as the accidental ingestion of dirt or other non-food items, and the individual must voluntarily consume the substance (1). The urge for pica can be compared to the addiction of tobacco, drugs, or the consumption of alcoholic beverages (1). The list of pica substances is countless, but a few of the major items include the consumption of: dirt, raw starch (uncooked pasta), ice, paper, chalk, eggshells, coffee grounds, matches, and in extreme cases needles or other sharp pointed items (1).

Body

Major Forms of Pica Disorder

The consumption of dirt, clay, and chalk for the nutritional value that they might contain is called geophagy (1). This practice is prevalent among pregnant women, and in some communities might reach up to 60% of the population (1). The soil can be prepared by baking or frying, and the amount of dirt ingested ranges from 20-40g, and can range from consuming pieces of pottery, or eating beans that have a high concentration of dirt found in them (1). Most of these items include some type of clay in them, which contains a compound called kaolin, which is an ingredient found in some anti-diarrhea medications (1). Another alternative to eating soil or clay is found in

the consumption of other non-nutritional foods such as raw starch which is known as amylophagy (1). Most of these starches come in the form of raw foods such as uncooked rice, pasta, and starchy rubbers (1). The consumption of these starches ranges from a couple of grams per day to 1kg (1). One other major form of pica disorder can be found in pagophagy which is the consumption of ice (1). Unlike the average person that might suck on an ice cube or two, someone who practices pagophagy consumes several glasses of ice a day (1).

Several Hypotheses

There are several hypotheses that explain the environmental factors that might cause the onset of pica. These hypotheses can be broken down into three sub-categories: hunger, micronutrient deficiency, and protection against toxin (8). Researchers, however, have found little to no information on the genetic basis or mechanism that is associated with pica disorder. This lack of data is associated with researchers not having acknowledged that pica disorder is prevalent among many populations of the world today, and the belief that pica is just a mental ailment (8).

Conducted Research on Anemic properties and Pica Disorder

The main hypothesis concerning pica disorder is the association between pica and anemia (1). Some researchers have hypothesized that pica is a symptom which is developed when one becomes anemic (1). In two different studies, pregnant women were tested for several different variables. In the first study, researchers took a group of 823 pregnant women from Turkey and analyzed their relationship between anemia and pica (5). The second <https://assignbuster.com/overview-and-causes-of-pica-disorder-biology-essay/>

study consisted of pregnant women found in Tanzania that were tested to see pica's involvement with immunodeficiency diseases (HIV), iron deficiency, soil transmitted helminth infections such as malaria, and the potential danger of infection of parasites (7). The demand for iron in a pregnant woman is much greater than the average human because of the increasing amount of blood cells needed for the mother and the fetus (7). The lack of iron can result in iron-deficiency anemia, abortions, false labors, and multiparity (5). In a worldwide study it was found that 20% of all maternal deaths resulted from anemia, and can also lead to premature births, underdeveloped infants, increased infant fatality, and a decrease in fertility (5). In the study done in Turkey, researchers were able to find that out of the 823 pregnant women studied, 1 out of 10 exhibited pica behavior (5). Most of these women were illiterate and were in a lower social class that resulted in less consumption of animal protein, and the lack of funds to take iron supplements during their pregnancy which resulted in deficient amount of iron, folate, and vitamin B12 during their pregnancy (5). In the study done in Tanzania, researchers found that 82.6% of the women studied had anemia where about 29% ate soil on a regular basis (7). Those that consumed soil were 75% more likely to have severe anemia when compared to those that didn't (7). Women that showed signs of iron deficiency (such as a decrease number of hemoglobin) were also more likely to consume pica substances (7). There was no correlation between HIV and geophagy, and women that had malaria did not consume soil which could be a result of soil containing traces of iron which makes the conditions of malaria worse (7). The amount of *Ascaris lumbricoides* (round worm) found in the pregnant women was much higher in those who practiced geophagy (7). Geophagy <https://assignbuster.com/overview-and-causes-of-pica-disorder-biology-essay/>

became more prevalent as the pregnancy progressed (7). This could be the body's response of supplying more iron to form more hemoglobin (7).

Another proposed hypothesis is that when an individual practices in consuming non-food related items this can result in anemia (1). This hypothesis states that the intake of non-nutritional elements does not result in a positive result or a decrease in this deficiency (1). The mechanism behind this phenomenon is found to be caused by tissue enzyme deficiency and this includes Fe and Zn deficiencies which play a role in appetite regulating brain enzymes (1).

In one study, three subjects were tested that exhibited different types of pica (4). One subject consumed at least two super-sized McDonald soda cups filled with ice a day which resulted in heavy bleeding during her menstrual cycle (4). Another subject would drink iced water three to four times a day which resulted in the formation of colonic polyps which caused bleeding (4). The third and final subject would chew on rubber bands with a specific color and diameter (4). All three of the individuals were mentally stable, and had no history of mental ailments (4). After treated with iron supplementation, one subject was able to stop their pica condition while the other two were still undergoing treatment (4).

It has been suggested that the reason why individuals that have developed pica eat ice in an abnormal amount is because glossal pain on the tongue can develop because of iron deficiency, and the ice actually soothes the pain (4). It has also been suggested that stress that is formed in the upper gastrointestinal tract (such as heartburn or nausea) brings on the urge of

consuming pica elements (1). This is because some pica elements contain high traces of alkaline which can act a suppressor and reduce the gastric pH in the gastrointestinal organs which would reduce the pain induced by heartburn or nausea (1). This however does not take into account for the individual that chewed on rubber bands (4).

In another case report, a 22-year old African woman was diagnosed to have severe anemia (6). The woman had complained of immense fatigue, and it was found that she had been consuming a stone that was high in kaolinite and quartz for the past 15 years (5). After removing traces of the stone in her body and providing iron supplements, the woman was able to recover from her sever anemia, and a check up 3 months later showed a satisfactory blood count and stable iron levels (6). A possible reason to why this stone made the woman develop severe anemia is because of the high levels of kaolinite found in the stone (6). Kaolinite is a compound that is able to absorb concentrations of Fe^{2+} and Fe^{3+} in the duodenum, which is where iron is absorbed by the body (6). This could have caused her to develop a deficiency in iron which could have led to her having severe anemia (6).

In many cases of pica, iron deficiency or anemic properties are present in the individual (1). There have been positive results that show livestock that have developed iron deficiency and have engaged in pica activity have shown improvement in their iron deficiency (1). However, sodium is the only known nutrient that is craved in humans, and some data shows that most pica substances have little to no iron in them except for soil, which the iron content of is less known although some acid base tests have been taken which resulted in some pica substances containing nutritional elements such <https://assignbuster.com/overview-and-causes-of-pica-disorder-biology-essay/>

as Fe, Zn, Cu, and Ca (1). These tests however do not take into account the pH of the intestine, and the site of these nutritional elements such as Fe (1). Overall this hypothesis is an intriguing one, but does not have any current data that suggests that consuming pica elements actually help elevate iron deficiency or other nutritional deficiencies (1)

Pica used as protection against pathogens and toxins

A recent hypothesis that has come up in the scientific community is that pica substances are consumed to protect against harmful chemicals and pathogens (1). Clay is shown to exhibit toxin-binding properties, and kaolin (found in some clay) is an active ingredient found in some anti-diarrhea medications (3). These toxins can come from plants, which produce toxins as a protective measure against predators (1). These toxins can cause dizziness, muscle pains, and other unwanted side effects (1). Other chemicals can enter food via bacteria such as *Escherichia coli* and *Staphylococcus aureus* (1). Viruses and parasites can also enter the body and cause damage (1). In a study done with rats, the rats were injected with a chemotherapy agent (cisplatin), and then given doses of kaolin (3). The rats that were given kaolin showed less acute symptoms than the rats that were injected with cisplatin which exhibited a decrease in appetite, and weight loss (3). Kaolin could have played a role in decreasing the anxiety felt by the rats, and possibly sped up the recovery process (3). The mechanism on how clay and kaolin work on the body is still a mystery, and does not solidify the hypothesis that pica substances play a role in elevating pain from toxins or other chemicals (3).

Conclusion

Although pica disorder has been known since the time of Hippocrates, it is still a mystery to many researchers (1). The next step to further the knowledge about pica is to take a multidisciplinary approach, and to shift the idea of pica just being a mental ailment to pica also playing a physiological role in individuals (8). It is not fully understood to whether pica plays a role in the onset of anemic properties or if pica is a side effect of anemia (8). There is also the possibility that pica can contribute to the prevention or relief of toxins and pathogens from entering the blood stream (1). Although pica is not fully understood, it still must be taken seriously, as the effects are still not fully understood and could result in many complications that can lead to suffering for individuals that experience pica symptoms (1).