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Household wastes [fruits and vegetables peel] :An opportunity to minimize malnutrition

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Abstract- Background: Vegetables and fruits skin are high in nutrition and by the use of these skins we could minimize malnutrition. Malnutrition has been a serious problem , so many children still suffer from malnutrition and it should be eradicated. This study explores economical sources (which are often considered as industrial and household wastes) like skin of vegetables and fruits that are high in nutrition. For example, peels of potatoes , oranges , mangoes etc. could be a great source of carbohydrates , proteins , lipids , vitamins and minerals. By the use of these industrial and household wastes a food could be prepared. These products will be affordable for large population and could be an extraordinary opportunity to minimize malnutrition.

Conclusion: Use of these household and industrial wastes [peels, eggshells]

And converting it, making it ready for consuming as a meal and will be affordable for large population could be an extraordinary opportunity to Minimize malnutrition.

KEYWORDS

Food Industries , Household wastes, peels , seed, eggshell, minimize malnutrition.

Introduction

Malnutrition is a very serious problem since many years , even today many children suffer from malnutrition.

Nearly half of all deaths in children under 5 are due to undernutrition. Common infection turn out to be fatal for children suffering from undernutrition, as it increases the frequency of infection and delays recovery. Getting infection during undernutrition can potentially can create a potentially lethal cycle of worsening illness and deteriorating nutritional status. Poor nutrition in the first 1,000 days of a child's life can also lead to stunted growth, which is associated with impaired cognitive ability and reduced school and work performance. We are still far from a world without malnutrition. While the 2020 edition of the joint malnutrition estimates shows that stunting prevalence has been declining since the year 2000, more than one in five – 144 million children under 5 –were stunted in 2019, and 47 million suffered from wasting. Meanwhile, the number of overweight children worldwide has remained stagnant for more than a decade. [5]

Various forms of malnutrition

There are four sub categories of Undernutrition wasting , stunting , underweight , deficiencies in vitamins and minerals. Undernutrition makes children more vulnerable to disease and death. Low weight for height is wasting type. People suffering from this start losing weight because doesn't have enough to eat or they have infectious disease like diarrhoea. Low height of age is called stunting. It is the result of chronic undernutrition. Stunting may be due to poor socioeconomic condition, poor maternal health and nutrition. Stunting drags back children in reaching their proper physical and cognitive potential. Micronutrient related malnutrition occur due to improper uptake of minerals and vitamins as these are needed

for proper production of hormones proper functioning of enzymes and are necessary for proper growth and development. (10)

Household and industrial wastes like potato peel, orange peel, mango peel, eggshells could be an excellent opportunity to minimize malnutrition, as they are high in nutrition and loaded with carbohydrates, proteins, lipids, many vitamins and minerals. What is meant nothing for a person [wastes] could be a boon for other person

QUALITATIVE AND QUANTATIVE NUTRITION IN FRUIT AND VEGETABLE PEEL

Peels of orange, potato, mango and mango seed are enormous source of carbohydrates, protein, fats, vitamins and minerals. Orange peel is a source of Calcium, iron, zinc. Mango seed is a source of many vitamins and minerals like Vit A, E, K, C, B6, B12, B1, B2, minerals like Na, Ca, K, Fe, Mg, Mn, Zn. Different varieties of mango contain different levels of carbohydrates, proteins, fats, vitamins and minerals like Ca, Mg, Fe, Vit A and C. Eggshells are good source of calcium nearly half the eggshell is enough to meet daily calcium requirement.

POTATO PEEL

Table-1-Chemical composition of raw potato peel, g 100 g⁻¹ [1]

Compound	Minimum and maximum values	Average content
Water	83.3-85.1	84.2
Protein	1.2-2.3	1.8
Total lipids	0.1-0.4	0.3
Total carbohydrate	8.7-12.4	10.6

Potato peel is a common waste and byproduct of food industries concerned with food which include potato and potato peel are also common in garbage of house. Potato production has been increased up to 300 M/year, which is establishing a greater concern of waste management, as these peels are loaded with carbohydrates, protein, fats etc. [6] High content of starch (52 g 100 g⁻¹ of dry weight), contains protein on an average of (1.8g 100/g) and lipid (0.3g 100/g) (Table 1). potato being a source of carbohydrates, fats, proteins etc. could be a source of good balanced diet for a malnourished child. [1]

ORANGE PEEL

There is a remarkable increase in fruit production. India being the second largest producer of fruits and china being the largest, producing 81825 millions tonnes of fruits from 6892 million hectares area., large variety of fruit that india produces are banana, mango, citrus etc with production percentage of 32.6%, 22.1%, 12.4% respectively. (7) Food industries concerned with fruits in their food releases peels and seed as their by-products it need to be managed as these by-products could get fermented if not removed and could be home of many insects and could increase the risk of soil pollution. So household wastes also include fruits peels as their garbage items and a common fruit that almost get consumed in every house is orange and consumption of oranges produces its skin as a waste in every house, which is high in nutrition as it contains carbohydrates, lipids, proteins and many vitamins and minerals.

Table-2-Proximate composition (g/100g dry orange peel) [2]

Compound	g/100g
Carbohydrates	53.27 ± 0.10
Lipids	8.70 ± 0.65
Protein	9.73 ± 0.63

Values are means ± standard deviations of three replicate measurements.

Table-3-Mineral content in orange peel [2]

Minerals	Mg/100g dry peel
calcium	162.03±7.54
iron	19.95 ± 0.50
Zinc	6.84 ± 0.55

Values are means ± standard deviations of three replicate measurements.

Calcium is an important constituent of bones and teeth and it is involved in the regulation of nerve and muscle functions. Zinc is necessary for cellular replication and important for good immune response. Zinc also plays an important role in growth; it facilitates action of more than 300 enzymes by participating in their structure or in their catalytic and regulatory actions. Iron carries oxygen to the cells and is necessary for the production of energy, synthesis of collagen and the proper functioning of the immune system.

Orange peel has many health benefits, it provides iron, calcium, zinc which has many benefits to human body and is considered as nutrients, in addition orange peel also provides carbohydrates, protein, fats.

MANGO PEEL AND SEED

Table-4- Proximate composition of mango seeds.[8]

Composition	% (Dry weight)
Crude protein	10.06 ± 0.12
Crude oil	14.80 ± 0.13
Carbohydrate	70.12 ± 1.34
Energy content	453.92 ± 4.32 KJ/100 g

Each value is a mean of three determinations ± SEM.

Table-5-Vitamins contents (mg\100g) of mango seeds.[8]

Vitamins	Amount (mg\100 g)
A	15.27 (IU)
E	1.30
K	0.59
C	0.56
B12	0.12
B6	0.19
BI AND B2	0.08 AND 0.03

Table-6-Some mineral contents of mango seeds.[8]

Mineral	Composition (mg/100 g)
Na	21.0
K	22.3
Ca	111.3
Fe	11.9
Zn	1.10
Mn	0.04
Mg	94.8

Analysis of mango seed suggests that it is a promising source of carbohydrates, oil and protein and it yields a good amount of energy of 453.92 ± 4.32 KJ/100g. (8) Mango seed is very rich in calcium and magnesium and in antioxidant vitamins such as vitamin C, E and A, which suggests that mango seed could be used as an alternative source of these vitamins. Mango seed is also very rich in calcium and magnesium. Calcium is essential for regulating the heartbeat, conducting of nerve

impulses, for hormone secretions, clotting of blood and maintaining healthy bones. Magnesium is a co-factor for more than 300 enzymatic reactions in the human body.[8]

MANGO PEEL

Different variety of Mango peel contains different amount of Carbohydrates , Proteins , Fat , vitamins and minerals. The most common varieties are Paparanda , Julie and Peter.

Table-6.1. Proximate composition of the peels of different mango varieties.

Samples	Carbohydrates	Fat	Protein
Paparanda	66.83±0.41b	6.18±0.03b	1.93±0.05a
Julie	68.69±0.18c	5.85±0.05a	2.14±0.08b
Peter	64.83±0.25a	6.52±0.10c	2.48±0.09c

All data are means±SD of three replicates. Mean values followed by different letters in the same column differs significantly ($p \leq 0.05$). [3]

Table-6.2. Mineral composition of the peels different mango varieties (mg/100g)

Samples	Ca	Mg	Fe
Paparanda	60.40±0.17a	94.83±0.21a	10.48±0.30a
Julie	63.52±0.43b	109.15±0.13b	12.70±0.26b
Peter	67.47±0.31c	112.20±0.26c	13.50±0.20c

All data are the means±SD of three replicates. Mean values followed by different letters in the same column differs significantly ($p \leq 0.05$). [3]

Table-6.3. Vitamin A and C composition of the peels of different mango varieties.

Sample	Vitamin A	Vitamin C
Paparanda	9.14±0.04a	21.66±0.06a
Julie	11.32±0.04b	40.17±0.04b
Peter	11.98±0.31c	51.54±0.07c

All data are the means ± SD of three replicates. Mean values followed by different letters in the same column differ significantly ($P \leq 0.05$). [3]

Mango peel contains Carbohydrates, proteins , fats , vitamins and nutrients [vit A , vit C , Ca ,Mg, Fe]. As mango peels are common wastes in household and food industries and it can be excellent opportunity to minimize malnutrition.

EGG SHELLS

Calcium is an essential element and is required to maintain total body health. Human body needs calcium every day not just to keep your bones and teeth strong but also to maintain proper functioning of muscles and nerves. It also plays a crucial role in blood clotting.[9]

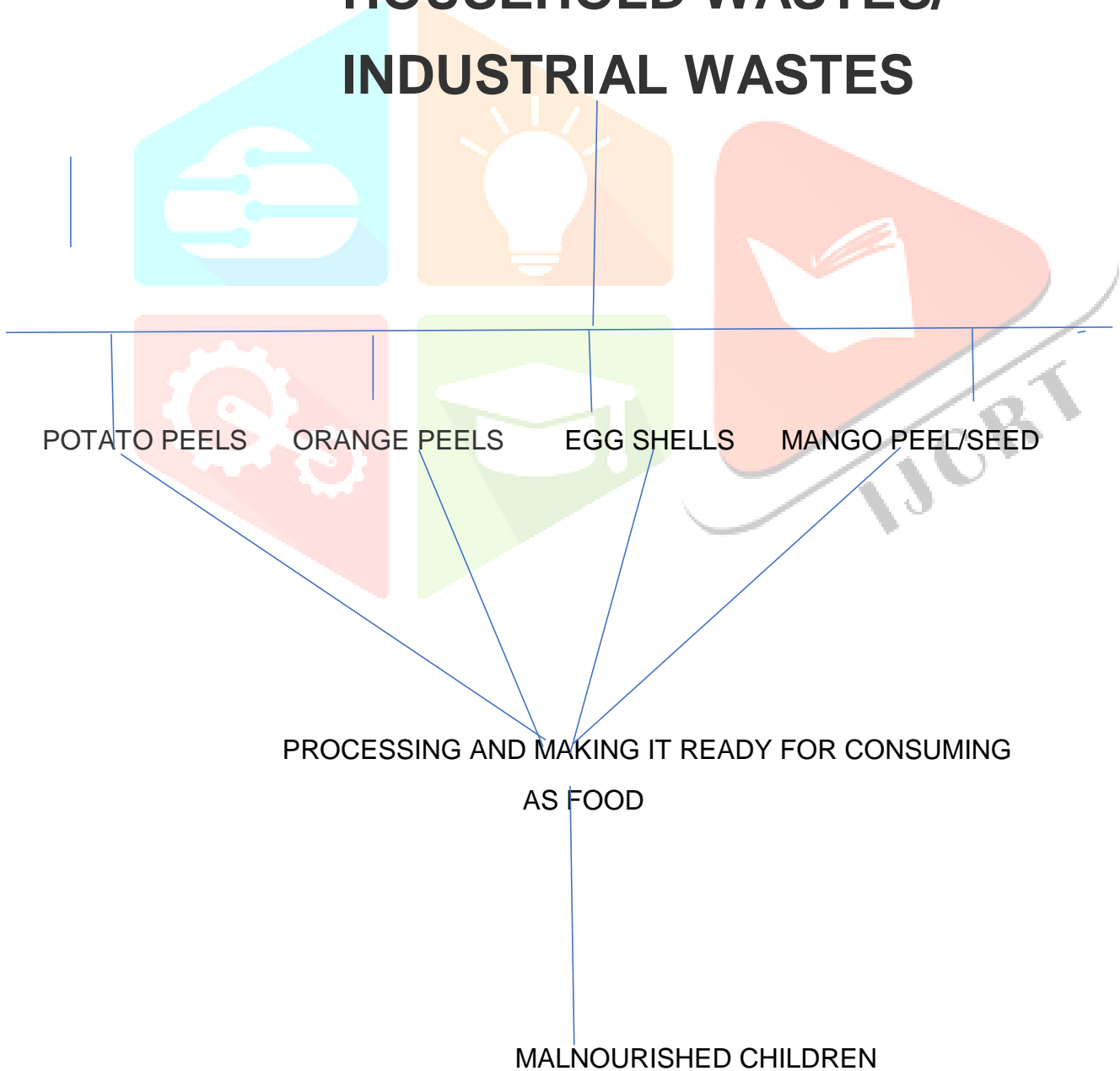
The Ca plays an important role in maintaining body functions such as i) Ca makes nerve impulse to function properly .The effect is mainly on the peripheral neuromuscular mechanism. Fibrillary twitching can be produced by per fusing a muscle with Ca free fluid. Automatic ganglia also become hyper irritable. ii) It is necessary for the maintaining the proper function of the skeletal muscles. An increase in the level of ionised calcium results in increase of contractility of skeletal muscles or vice-versa. iii) It is very essential for proper rhythming activity of heart. Ca is antidot to the depressant action of K. iv) It facilitate rennin enzyme in coagulation of milk in the stomach. v) It is essential for the clotting of blood.[9]

A single eggshell contains 2.07 ± 0.18 g of Ca; therefore half an eggshell could provide the amount of Ca needed by adult human beings per day.[4]

A child need daily calcium for a healthy being , due to lack of enough money children who are poor are unable of fulfil their daily calcium requirement as they could not afford dairy foods or other calcium sources. Eggshells which are considered as wastes is an enormous source of calcium and utilisation of it in edible form could solve calcium need of malnourished child.

METHODS

HOUSEHOLD WASTES/ INDUSTRIAL WASTES



Houses and food industries releases peels and seed as a byproduct or wastes, which are high in nutrition as they contains carbohydrates, protein , fats , many vitamins and minerals. As these wastes/byproducts could be a source of balanced diet and could prevent malnutrition. These byproducts are excellent opportunity to minimize malnutrition.

Wastes/byproducts produced by houses and food industries should be collected and processed so that could get converted as consumable food and should be given to malnourished child so that he / she could get healthy and can live a normal child life.

RESULT AND DISCUSSION

Potato peels are released in a huge amount in the form of wastes and by-products from food industries concerned with potato in their food items and as a garbage from common people's houses. Potato peels are loaded with Carbohydrates , Protein , Fats. Potato peel contains , g 100 g-1 (Table – 1)

Protein	Min – Max , 1.2-2.3	Average content - 1.8
Total lipids	Min – Max , 0.1-0.4	Average content - 0.3
Total carbohydrate	Min – Max , 8.7-12.4	Average content - 10.6

These peels are released in environment and can be home to many insects as they ferment in water and could pollute the environment on the other hand many children in the world suffer from malnutrition due to lack of enough money which could provide them Balanced diet. Potato peels are loaded with nutrition and can be an excellent opportunity to minimize malnutrition and food prepared of this could be affordable for poor people.

A common citrus fruit which is consumed in a huge amount is orange. Oranges are rich in nutrients contains many vitamins and minerals not only oranges , orange peels are also loaded with nutrients , it contains carbohydrates , proteins , fat and minerals like calcium , iron and zinc. :An orange peel composition (g/100g dry orange peel) (Table- 2)

Carbohydrates	53.27 ± 0.10
Lipids	8.70 ± 0.65
Protein	9.73 ± 0.63

And minerals (Mg/100g dry peel)

calcium	162.03±7.54
iron	19.95 ± 0.50
Zinc	6.84 ± 0.55

Food industries which uses fruits in their food product releases peels , seeds , pomace as a by-products and household garbage also include fruit peels and seeds. Mango fruits are commonly consume in india in large amount result in release of large amount of seed and peels as wastes. Mango seed contains [% (Dry weight)] (Table- 4)

Crude protein	10.06 ± 0.12
Crude oil	14.80 ± 0.13
Carbohydrate	70.12 ±1.34
Energy content	453.92 ± 4.32 KJ/100 g

Mango seeds contains Vitamins like B6 , B12 , B1 , B2 , A , E , K ,C (Table- 4) and minerals like (Table – 5)

Na
K
Ca
Fe
Zn
Mn
Mg

Mango peel contains (Table 6.1)

Carbohydrates	Fat	Protein
66.83±0.41b	6.18±0.03b	1.93±0.05a

It also contains minerals like Ca, Mg, Fe and vit A and C. (Table 6.2 and Table 6.3)

EGGSHELLS

A single eggshell contains 2.07 ± 0.18 g of Ca; therefore half an eggshell could provide the amount of Ca needed by adult human beings per day. (4)

Potato peel, orange peel, mango peel, mango seed, eggshells are source of carbohydrates, proteins, fats, many vitamins and minerals. Commonly these are produced as wastes and by-products from food industries and common houses. It can be collected from food industries and houses and given required processing and converted into consumable food form and should be given to malnourished child and it will come out to be an excellent opportunity to minimize malnutrition.

So many children across the globe suffer from malnutrition due in proper diet as a result of not having enough money to their parents / guardian. As upper discussed by-products are wastes for upper class and middle class houses and for food industries and are high in nutrition as discussed above. These by-products and wastes could serve an excellent opportunity to minimize malnutrition.

CONCLUSION

According to unicef data 2020, We are still far from a world without malnutrition. While the 2020 edition of the joint malnutrition estimates shows that stunting prevalence has been declining since the year 2000, more than one in five – 144 million children under 5 – were stunted in 2019.

Nearly half of all deaths in children under 5 are attributable to undernutrition; undernutrition puts children at greater risk of dying from common infections, increases the frequency and severity of such infections, and delays recovery.

Food industries and common household wastes are potato peel, orange peel, mango seed, mango peel and eggshells. These are loaded with carbohydrates, protein, fats, vitamin and minerals after processing them and changing them so as it could be taken as meal by the malnourished child. This will turn out to be an excellent opportunity to reduce malnutrition and it also could manage wastes and will prevent environment to get polluted.

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