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Therapeutic nutrition against *Zika virus* infection: An update

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Abstract
Zika virus is the mosquito-borne *Flavivirus* which may develop Zika syndrome, it develops psychiatric illness, featured through microcephaly along with mental complication and even also death of foetus. First *Zika virus* is recognised from mosquito species *Aedes africanus* in the Ziika forest of Uganda. In general, ZIKV are very much prominent among affected healthy children and adults by skin rashes along with trouble in joints, conjunctivitis, malaise, headache that are present for 2 to 7 days. In case of pregnant women, complications of this virus are congenital brain disorder and ocular imperfection in foetus, faultiness of brain including microcephaly besides ocular obstruction like microphthalmia, weakness in optic nerve, cataracts are also recognised. Some bioactive constituent like nutraceuticals have immense effect to protect human from *Zika virus* manifestation including Brazilian peppertree fruit peel extract, isoquercitrin, curcumin, Docosahexaenoic acid (DHA) and soon.

Keywords: Virus, therapeutic diet, curcumin, mosquito- borne, brain disorder, human health

Introduction
Zika virus is the mosquito-borne *Flavivirus* which may develop Zika syndrome that is attached along with psychiatric illness, featured through microcephaly along with mental complication and even also death of foetus. Researchers are very much look forward to mitigate this issue about different angles of this virus borne infection however specific treatment therapeutically still not present. After some time for confirmation, *Zika virus* is secluded from mosquito species *Aedes africanus* in the Ziika forest of Uganda [1]. Authors have noted that, from human, first this virus was isolated along with pyrexia as clinical manifestation observed by Simpson and coworkers in 1964 [2]. The development of neurological disturbances shows in stage of infancy because at the time of pregnancy, mother has affected by mosquito borne *Zika virus* (ZIKV) [3]. At first, the ZIKV was observed from Yap Island in Micronesia [4]. In the year of 2013-2014, this disorder is very much erupted broadly in French Polynesia [5]. Noteworthy, the present vectors and *Zika virus* (ZIKV) to a population without any previous expression besides another prevalence of symptoms like dengue and chikungunya [6-9]. Noteworthy, in 2015, ZIKV extensively outbreak in Brazil, Colombia, Honduras, Puerto Rico Jamaica, Haiti and so on [10]. Moreover, in 2016, ZIKV outbreak prevalently in the state of Florida in 2016 [11]. Noteworthy, this disease is usually developed firstly through the bite of infectious mosquito like *Aedes aegypti, Aedes albopictus* [12]. This harmful infestation may be transferred from sick mother to foetus at the time of pregnancy, noteworthy it can be also intercourse related harmful distress because ZIKA RNA is ascertained in semen sample of affected mother there after 6 months of infestation [13, 14]. Moreover, blood transmission from harmful persons may also be another poisonous source for expressing ZIKV [15]. The virus reproduces in the epithelial membrane in the gut of mosquitoes there after outspread to the salivary gland of mosquitoes after that virus are transmitted to human through bites of mosquito [16, 17]. In accordance with [18] wild macaques are allowed to ZIKV infestation. Authors have reported that, the arbovirus infestation heed sylvatic cycle along with non-human primates as the pool of virus [19]. ZIKV proteins have lots of negative applications for instance protein envelope (E) is involved into attaching with host cells and membrane amalgamation [20], Capsid is the viral

protein that is present in border of nucleic acid [21], according to [22], membrane protein is related to proteolytic breakdown of pre membrane protein from membranous protein molecule in the Golgi body therefore virus are present freely. NS1 replicates RNA [23], NS2A regulates many viral constituents due to assembling [24], NS2B is the co-factor of NS3 protease [25], NS3 is the protease and helicase sphere for polyprotein possessing and function of nucleoside triphosphatase (NTPase)/ RNA triphosphatase (RTPase). NS4A avoid innate immunity connected along with replication process [26, 27], according to [28] NS5 is methyl transferase (MTase) besides RNA dependent RNA polymerase (RdRp).

In general, ZIKV are very much prominent among affected healthy children and adults by skin rashes along with trouble in joints, conjunctivitis, malaise, headache that are present for 2 to 7 days [29]. For pregnant women, rashes with ZIKV infestations are observed extensively when they are affected by this harmful virus [30], symptoms are including congenital brain disorder and ocular imperfection in foetus, faultiness of brain including microcephaly, cerebral atrophy, subcortical calcifications, agyria, ventriculomegaly and hydrocephalus [31], ocular obstruction for instance microphthalmia, weakness in optic nerve, cataracts, and intraocular calcifications. Decreased motion of musculoskeletal tissues, dysphagia, hypertonia, hypotonia, seizures and irritation etc. [32]. Authors have revealed that, ZIKV is attached along with progression of Guillain-Barre disease in adults, this is recognised as auto-immune disorders which influence central nervous system [33].

Therapeutic Nutrition against *Zika virus*

A meal plan that restricts the consumption of particular foods or nutrients is known as a therapeutic diet [54].

Nutraceuticals

It is the plant derived phytonutrients which have extensive health advantages [34]. Some nutraceuticals have antiviral efficacy against ZIKV. Nutraceuticals adhere along with ZIKV protein, these are kanzonol V from root of Licorice, cinnamoyle chinaxanthol derived from root of *Echinacea*, cimiphenol get from black coloured cohosh, rosemarinic acid obtain from rosemary, lemon balm and common sage [35]. Authors have pointed that, isoquercitrin is the flavonoid that impede along with arrival of the virion into target cell membrane [36]. Turmeric carrying phenolic bioactive component curcumin stop ZIKV bonding to cell membrane [37]. Authors have also conveyed that, phenolic metabolite like gossypol is present in cotton seeds have lots of anti-ZIKV function through interrelating along with envelope protein domain III of this harmful *Zika virus* [38]. Apart from that, F-6 and FAc-2 are plentiful into cycle diterpenes along with aldehyde groups from brown seed which are excessively available in Brazil, it has good anti-viral capacity against ZIKV [39]. Polyphenolic constituents like delphinidin and epigallocatechin gallate these are obtainable in beverages like tea, wine which have better antiviral function against ZIKV [40, 41]. Moreover, isoquinoline alkaloid obtains from berberine besides emodin is the anthraquinone, easily get from *Aloe vera*, *Rheum palmatum* etc. [42]. Flavonoid component naringenin gets from citrus fruit have anti-viral function through attaching towards protease domain of the NS2B-NS3 protein [43]. Authors have conveyed that, flavonoids have better anti-ZIKV functions like 6-deoxyglucose-diphyllin observes in willow-leaved Justicia, which stop assistance of stomach low pH into lysosome and endosome that acknowledge detrimental virus to mingle [44]. Noteworthy, red spider lily has good protection to stop the prevalence of ZIKV [45]. *Doratoxylon apetalum* (Poir.) Radlk extraction has acceptable antiviral efficacy against oxidative damage **[46]**. Furthermore, ZIKV affect corticoid organ of humans and microcephaly in newborn babies [47] therefore ω-3 PUFA like docosahexaenoic acid has enormous preventing capacity of ZIKV induced neuronal damage [48].

Table 1: Some another bioactive component and it's effectivity upon human health

Bioactive constituents	Defence mechanism	References
Brazilian peppertree fruit peel extract	Resveratrol in this fruit peels stop replicating process of ZIKV besides promote virucidal activity.	[49, 50]
Isoquercitrin	Has anti ZIKV functions and it's glycosylated moiety arrest internalisation of ZIKV infestation into human cell membrane.	[36]
Curcumin	Restrict along with ZIKV envelope adhering to the cell membrane by viral RNA integration.	[37]
Docosahexaenoic acid (DHA)	DHA reinstate the mitochondrial activity and stop oxidative damage.	[48]
Doratoxylon apetalum (indigenous medicinal tree)	Stop the viral entry into host cells therefore obstruct ZIKV administration into cell membrane and stop virus replication.	[46]
Cinnamic acid	Hindered the function of RdRp (RNA dependent RNA polymerase).	[51]
Palmatine	It has virucidal activity.	[52]
Harringtonine	Carries virucidal application simultaneously have prophylaxis functions.	[53]
Digitonin, conessine	They marked host cell presence along with replication mechanism of ZIKV infection.	[38]
Delphinidin and epigallocatechin	Obstruct two distinct ZIKV strains like MR766, PA259459 it is possible because of E protein has individual amino acid configuration.	[40, 41]

Conclusion

Zika virus is the mosquito-borne disorder that generate Zika syndrome. ZIKV is very much interrelated along with congenital Zika sickness that are associated along with birth problems like intrauterine growth restriction (IUGR), ocular vandalise, microcephaly to the foetus. ZIKV infestation is the sexually transmitted disorders therefore it is channelized from placenta of mother to foetus. Phenolic bioactive constituents assure to give protection against ZIKA syndrome. Further Research must be needed to protect children and adults from *Zika virus* manifestation as it has been prevalent vigorously before few years. Precisely it is very much harmful infection that affect any people widely.

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