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COVID-19 and the role of chiropractic in the healthcare arena with non-pharmaceutical prevention, early treatment, and care for those with Long COVID syndromes:

Part Three - Long COVID

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Abstract: One huge challenge in treatment of Long COVID disorders in the future will be unraveling the tangled threads of whether a presenting condition is directly related to the virus' affect on the body or possibly just the social implications of dealing with the pandemic and the ability of a subset of patients to cope. In each stage of coping with COVID-19, prevention, early treatment, and treating Long COVID, there are subtle differences in perspective and goals. One not so subtle difference is that persistent malnutrition appears to be comorbidity factor in all three scenarios so improving a patient's general nutrition is a basic though crucial first step. There are mixed approaches for treatment of Long COVID which include a multi-nutrient, herbal, and probiotic therapeutic approach (31) and a nutritional supplement based on vitamins, minerals, amino acids and plant extracts

Indexing Terms: chiropractic; immunity; COVID; Long COVID; Long Hauler; comorbidity.

Introduction

We are approaching the tip of the iceberg of what might be Long COVID and how to treat this condition. 'Emerging data suggest that the effects of infection with SARS-CoV-2 are far reaching extending beyond those with severe acute disease. Specifically, the presence of persistent symptoms after apparent resolution from COVID-19 have frequently been reported throughout the pandemic by individuals labeled as "long-haulers".' (1)

> *... The worldwide effects of Covid on our society might open international healthcare 'doors' of cooperation and openness ...'*

Huang et al (1) attempted to develop a prediction model for who might become a long hauler based on symptoms. They found that '*27% reported persistent symptoms after 60 days. Women were more likely to become long-haulers, and all age groups were represented with those aged 50 ± 20 years comprising 72% of cases. Presenting symptoms included palpitations, chronic*

rhinitis, dysgeusia, chills, insomnia, hyperhidrosis, anxiety, sore throat, and headache among others.' (1)

They '*identified 5 symptom clusters at day 61+: chest pain-cough, dyspnea-cough, anxiety-tachycardia, abdominal pain-nausea, and low back pain-joint pain. Long-haulers represent a very significant public health concern*,' (1) and found that currently there are no guidelines to address their diagnosis and management.

A systematic study by Cabrera Martimbianco et al (2) determined that Long COVID is found from 3 to 24 weeks after acute phase or hospital discharge frequency with occurrences ranging from 4.7% to 80%. '*Potentially associated risk factors were old age, female sex, severe clinical status, a high number of comorbidities, hospital admission, and oxygen supplementation at the acute phase.*' (2) Another systematic study by Groff et al (3) determined that more than half of COVID-19 survivors experienced long hauler syndrome 6 months after recovery. '*The most common [Postacute Sequelae of SARS-CoV-2] involved functional mobility impairments, pulmonary abnormalities, and mental health disorders.*' (3) '*Other potential etiologies include unmasking of comorbidities, residual damage from acute infection, and persistent viral replication*'. (4)

In contrast to the Cabrera Martimbianco et al (2) study according to van Kessel et al, severity of Covid symptoms may not be a predictor of patients who might present with Long COVID. This is because there is '*evidence that symptoms of mild COVID-19 persist after 3 weeks in a third of patients*.' (5) Indeed there is a possibility that the symptoms described may be due to a number of different syndromes (e.g. Post-Intensive Care syndrome, Post-Viral Fatigue syndrome and Long-Term Covid syndrome). Some people may be suffering with more than one syndrome at the same time. (6, 7)

It appears that middle-age women, are significantly more likely to develop Long COVID. (8) '*Although the exact mechanisms are not clear yet, a persistent subclinical inflammatory hypothesis associated with an autoimmune reaction are thought to partially explain the higher incidence of this syndrome among women*' (9, 10, 11) with middle aged women facing a greater risk of debilitating long term symptoms. (12)

One huge challenge in treatment of Long COVID disorders in the future will be unraveling the tangled threads of whether a presenting condition is directly related to the virus' affect on the body or possibly just the social implications of dealing with the pandemic and the ability of a subset of patients to cope. For instance, a syndrome termed Covid Stress Disorder, '*consists of five inter-correlated elements: (a) fear of SARSCoV2 infection and fear of coming into contact with objects or surfaces contaminated with the coronavirus; (b) fear of socio-economic impacts of the pandemic; (c) fear of foreigners for fear that they are infected; (d) pandemic-related compulsive checking and reassurance-seeking; and (e) pandemic-related traumatic stress symptoms. A severe form of the syndrome, characterized by clinically significant distress and impairment in functioning*,' (13) ' *... is regarded as a pandemic-related adjustment disorder*.' (13)

Where chiropractors treating patients with Long COVID would have to exercise extreme caution is with patients affected by the cardiovascular, (11) pulmonary, (14) and renal (15) systems which may represent life threatening situations for Long COVID survivors. Ideally if there is any hint that a patient might be suffering from a system disorder they should be immediately referred for collaborative allopathic care. Treatment of Long COVID will likely need a team of multidisciplinary doctors sharing their expertise and skills to help unravel what might be the most optimal care for a patient. Psychotherapeutic care may be an important aspect of this care since Long COVID can affect mental/emotional processing and this may persist beyond any body system disorder. (16)

An often overlooked aspect of chiropractic care is its complementary therapeutic applications in the treatment of psychosomatic and somatopsychic interrelationships. '*Long COVID-19 bears a*

resemblance to functional somatic syndromes characterized by persistent somatic symptoms of unclear etiology.' (17) Ballering et al (17) note that with Long COVID dualistic thinking, that is the body-versus-the-mind concept, often allows healthcare professionals, to assume that patients should just '*toughen up*' as nothing appears to be physically wrong. (18) '*Thus, in persistent somatic symptoms social stigmatization stems from the psychosomatic connotation of symptoms: the blame projected towards people affected by persistent somatic symptoms refers to the perceived inability of people to waver their symptoms.*' (19) These negative attitudes are likely to negatively impact help-seeking behavior for these symptoms as is commonly seen in other (infectious) diseases. (20)

It is important to understand that a mind body approach for some patients with Long COVID may be crucial to long term care of this patient subset group. That may mean that patients with anxiety and other persisting emotional disorders may benefit from chiropractic care. And conversely patients with persisting somatic disorders presenting for chiropractic care may need psychotherapeutic care to facilitate their recovery. Long COVID that affects the mind and body may represent a complex group of disorders related to neurological compromise, dysautonomia, and post-traumatic stress due to having had or living with fear of COVID-19.

Some of the most common side effects among COVID-19 with long hauler syndrome that might be amenable to chiropractic care involve: spinal pain, (21) anxiety, (22) dysautonomia, (23, 24) and various types of stress disorders. While chiropractic may not have a manipulative therapy for all the various Long COVID disorders, such as anosmia (24, 25. 26) … still along with chiropractic manipulative care - diet, nutritional supplements, and herbal recommendations might be utilized in a complementary manner for low risk co-treatment of these disorders.

Every day we are learning something new about Long COVID and most of the research suggests that this residual side effect of COVID-19 and new wave of variants will produce another public health crisis on the heels of the current pandemic. (27) So developing conservative, low risk options for treatment working incrementally towards higher-risk interventions is always preferred. Wholistic chiropractic care (28, 29) that involves lifestyle advice, nutritional recommendation, and manual therapies could represent a portal of entry for Long COVID patients.

Nutritional, Vitamins, and Herbal Supplementation for Long COVID

In each stage of coping with COVID-19, prevention, early treatment, and treating Long COVID, there are subtle differences in perspective and goals. One not so subtle difference is that persistent malnutrition appears to be comorbidity factor in all three scenarios so improving a patient's general nutrition is a basic though crucial first step. (30) It does appear there are mixed approaches for treatment of Long COVID which include a multi-nutrient, herbal, and probiotic therapeutic approach (31) and a nutritional supplement based on vitamins, minerals, amino acids and plant extracts '*to help reduce chronic fatigue and improve quality of life and health status in subjects after SARS-CoV-2 negativity due to the synergistic effect of its components.*' (32) Another recent study also found that '*… resveratrol, vitamin D, and melatonin* (33) *seem to create an advantage for the healing of the long hauler patients affected by chronic symptoms of constant chest and heart pain, intestinal disorders, headache, difficulty concentrating, memory loss, and tachycardia.*' (33)

However a theme seems to be emerging that Long COVID may have comorbidity components associated with compromised methylalization affecting vitamin B12 and folate status, (34, 35) dysregulation of l-Tryptophan absorption, (36) and deficiencies of vitamin C, (37) vitamin D. (38) and melatonin. (39) Since most of the vitamins and nutrients offer low risk it may be that rather than needing to do tests to assess blood levels (preferred for accuracy of intervention) the treatment and patient's response can become part of the diagnostic process.

As noted Long COVID may have specific instigators associated with not only factors of methylalization and l-tryptophan absorption but also related to mast cell activation.

McCaddon and Regland (34) propose that reminiscent of vitamin B12 deficiency, a condition in which SARS-CoV-2 infection compromises methyl-group function, might also apply to similar conditions such as myalgic encephalomyelitis/chronic fatigue syndrome. They therefore suggest assessing patients with Long COVID of their vitamin B12 and folate status, including serum folate as well as homocysteine and methylmalonic acid status. (34)

Eroğlu et al (36) suggest that '*SARS-CoV-2 infection causes long-term dysregulation of l-Tryptophan absorption from the intestines due to an ACE2 imbalance in the gastrointestinal system*.' (36) They believe that Tryptophan metabolism is disturbed in favor of the kynurenine pathway. Low serum and muscle tryptophan levels, as well as elevated kynurenine levels, may be to blame for COVID-19's most common long-term symptoms, such as depression, sleep disturbances, fatigue, and muscle weakness - which are similar to the symptoms of tryptophan deficiency. Ultimately people who have had COVID-19 should be evaluated for nutritional status and levels of tryptophan and its metabolites in the long term. (36)

Hyper-inflammation caused by COVID-19 may be mediated by mast cell activation and has also been hypothesized to be a cause of long-Covid symptoms. (40) Weinstock et al (40) have seen improvement in Long COVID patients using a varying combination of mast cell-directed therapies including flavonoids (41) (quercetin (42) and lutein (43)), and vitamins C and D. (40)

Some novel herbal therapies involve cannabis and olive pomace oil. Sarkar et al (44) noted that 'the molecular docking and simulation studies revealed that Cannabidiol (CBD) and Cannabivarin (CVN) obtained from Cannabis can bind to post-Covid symptoms related central nervous system (CNS) proteins and downregulate them which can be beneficial in post-Covid symptoms treatment strategy.' (44) Whereas Theoharides et al suggest that COVID-19 leads to long-COVID syndrome associated primarily with cognitive dysfunction and fatigue and that these symptoms '*could be mitigated by phytosomal formulation (in olive pomace oil) of the natural flavonoid luteolin.*' (45)

While taste disorders have been commonly attributed to the Long COVID's affect on a patient's inability to smell other studies are finding that something unusual is going on in the tongue epithelial cells of patients recovering from a SARS-CoV-2 infection. Interestingly prolonged taste disorders and viral shedding suggest anatomical reservoirs for SARS-CoV2 that acts as a source for active or latent taste dysfunction in Long COVID-19. (46)

A study by Srinivasan suggests that the virus persists in the tongue epithelial cells and could adversely affect the microbiota contributing to Long COVID syndromes. (46) The concept is that well after the innate immune response suppresses the virus '*prolonged perturbations of the commensal microbiota will likely precipitate exaggerated inflammatory responses*' (47) Due to this possible scenario patients with Long COVID may want to use mouthwashes (see Part Two – Early Treatment section on mouthwashes) as well as oral pre- and probiotics (48) for care of some Long COVID patient presentations.

Lifestyle Modifications

Recent epidemiological studies indicate that regular physical activity is associated with a reduced risk for COVID-19, similar to what has been reported for other respiratory infections. (49) There is a growing awareness that COVID-19 can cause sustained morbidity in some patients, and reduction of any Covid comorbidity by increasing physical exercise may aid in patient's ability to cope with Long COVID. (50)

It is unclear the specific causes of Long COVID-related fatigue which can be debilitating, and may affect young previous healthy people. This may be a cardiovascular, neurological, nutritional,

and/or have a yet undetermined causation. However hyperbaric oxygen therapy maybe another low risk option since a study by Robbins et al found positive results for the '*potential benefits of hyperbaric oxygen therapy, with statistically significant results following 10 sessions.*' (51)

Chiropractic and Long COVID Strategies

Even before COVID-19 long hauler syndrome and its relationship to spinal pain, the chiropractic profession has been called to arms to deal with the '*global problem of low back pain, and the challenges that low back pain presents to healthcare practitioners and policy makers*.' French et al note that '*chiropractors are well placed to reduce the burden of low back pain …*' (52) There is emerging evidence is suggesting that COVID-19 might exacerbate vertebral disorders and contribute to prior controlled spinal conditions.

'B*ased on the high prevalence of musculoskeletal and joint pain and nervous system involvement, vertebral pain and nerve root impairment in Long COVID-19 is underestimated*.' (21) '*Although low back pain in Long COVID-19 may be short on evidence for optimal therapy*' early clinical findings suggest 'that standard therapeutic procedures provide satisfactory relief in vertebral pain management and increase the quality of life in post-COVID syndrome.' (21)

Studies are finding that SARS-CoV-2 cases can result in prolonged pain, morbidity and the resultant '*Long COVID syndrome*'. This syndrome may be associated with changes in nociceptor excitability that would be expected to promote pain, induce neuropathies, and possibly worsen existing pain conditions. (53) Of importance is that multiple studies have found that chiropractic care patients exhibit '*improved strength and endurance, as well as reduced low back pain intensity and disability.*' (54) For instance a study by Ailliet et al found that ninety percentage of patients with '*low back pain presenting to chiropractors have a 30% improvement within 6 weeks …*' (55)

With the long term effects of Long COVID syndrome it may be important that patients with low back pain receive a form of chiropractic maintenance care since recovery from their condition is likely to take time and consistency of treatment. (56) An important consideration is that for patients post COVID-19 and with Long COVID syndrome they would likely prefer to reduce any reliance on pharmaceutical interventions with their possible side effects and reliance. In this arena chiropractic non-pharmaceutical care has effectively offered care for back pain without the reliance on or abuse associated with medications. (57, 58)

While treatment of spinal pain syndromes is commonly associated with chiropractic care, since Long COVID's care options are limited, low risk interventions to co-manage non-musculoskeletal patients with complex presentation in multidisciplinary arenas59 may warrant consideration. With prudence, chiropractic care could be utilized to help co-manage care for non-musculoskeletal conditions such as immune function60, metabolic syndromes (e.g. diabetes type two) (61, 62) respiratory compromise, (63, 64, 65, 66, 67, 68, 69, 70) and anxiety. (71, 72, 73, 74)

Working Together to Treat Long COVID

It will take a global community of multidisciplinary healthcare providers working together help deal with the secondary effects from SARS-CoV-2 infections and associated Long COVID syndrome. Aside from pharmaceutical and other high risk approaches for treatment it appears that complementary alternative medical (CAM) '*interventions have a positive effect on improving the various dimensions of coronavirus disease but since there are few studies in this regard, further studies using different CAM approaches are recommended.*' (75) These include interventions such as:

- 'Whole medical systems, alternative medical systems (traditional Chinese medicine, Ayurvedic medicine, homeopathy)
- 'Mind-body treatments (meditation, yoga dance, art, music)

- ‘Biologically based therapies (botanicals, herbal supplements, vitamins, whole diets, functional foods, etc.)
- ‘Manipulative and body-based methods (osteopathic manipulation, chiropractic, massage, reflexology)
- Energy therapies (acupuncture, Qi gong, healing touch, therapeutic touch, Reiki)’ (75)

Exploring low risk conservative care options for patients suffering from COVID-19 and Long COVID may open doors for collaboration between allopathic and complementary alternative medical physicians. The worldwide effects of Covid on our society might open international healthcare ‘doors’ of cooperation and openness, which may help improve the healthcare of humanity beyond this current pandemic.

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