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Research Article

Assessment of Vitamin D And Correlation of It With Other Biochemical Parameters Related To Hair Loss

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Abstract

A widespread issue that the may impact people of all ages and genders, thinning hair has a variety of reasons. This Replacement Kidneys Department at Al-Kafel Hospital in the the city of Karbala district of Iraqi served as the investigation's site. forty-five cases in all, comprising twenty-five people experiencing lost hair through Twenty control systems, were investigated in Iraqi between the first of July and the last day of November in 2022. For the purpose of to assess how they participate within the onset of loss of hair, this research compared serum concentrations of the hormone vitamin D, ferritin, and zinc oxide among people with hair loss that is diffuse and in normal people. Additionally, it sought to foresee and identify the the development and accessible diagnostic procedures during human hair loss immediately.

Twenty standards and twenty patients with hair loss made up the 45 cases that were analyzed. Individuals with hair loss served as the test specimens, while none of the investigation's participants smoked or suffered severe overeating. The patients are around the decades of Ten and Forty. Five milliliters of sterilized fresh blood from each person were extracted from each blood vessel, and the concentrations of zinc, D3, vitamin D3, and ferritin were measured.According to the investigation's findings, people with hair loss have significantly lower levels of the antioxidant vitamin D3, ferritin, and zinc than those with normal hair. vitamin D3 levels in females are significantly lower than in males. However, this isn't a statistically important distinction. However, there is no statistically significant variance ($p<0.05$) among male and female people who experience receding hair in terms of serum ferritin and iron concentrations. In the present research, people who had hair loss showed a favorable correlation between age and vitamin D3.

Improved comprehension of the reasons of loss of hair is provided by the investigation, which links insufficient vitamin D3 to a drop in ferritin and zinc, which raises the patient's chance of hair loss. Additionally, this study demonstrates that female individuals with diminished hair growth may have lower levels of vitamin D and serum ferritin, a measure of iron status. All patients had zinc deficits identified. Therefore, it is imperative that all patients who report widespread lack of hair have their vitamin zinc levels checked on a regular basis.

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1. Introduction

A prevalent ailment that can impact people of all ages and genders is hair loss. dermatologists are typically consulted by women for problems with beauty. Consequently, it appears that women experience thinning locks with greater frequency than men [1]. There are three separate phases in one's hair development lifecycle. These include the growing period (anagen), the degeneration period (catagen), then the stage of rest (telogen phase) [2]. The loss of hair can be caused by a number of things, including medications, psychological and physical strain, and inadequate nutrition [3]. Diffuse loss of hair can result from a variety of medical problems, medications, psychological and psychological strain, genetic predispositions, including dietary deficiencies. Nonetheless, there is ongoing debate upon the need to assess dietary habits and the use of supplementation in treating hair loss [4].

Anyone experiencing widespread loss of hair should typically have their levels of thyr0id hormone and iron insufficiency evaluated. The precise contribution of deficiencies in zinc to the pathogenesis of widespread thinning hair remains to be established, but [5]. Because of its anti-inflammation and immune-modulatory qualities as well as the capacity to regulate keratinocyte division and growth, vitamin D, a vitamin and hormone, is crucial in dermatitis including thermotherapeutic. Investigation upon its involvement in hair loss is ongoing, and it also has an impact on the development of hair [6]. Despite being so small, hair shafts were intricate extensions of the skin whose disruptions have a significant effect on people's mental and physical well-being.

Hair covering overall the identification of baldness and hypertrichosis are mostly determined by changes in the characteristics of hair follicle dimensions, quantity per single layer of the epidermis and their development cycling frequency [7]. The longevity of mammals living depends primarily on the outer layer of skin, which is the second biggest organ in the body after the bones [8].

Adult developmental ect0derm as well as mes0derm, whose giving the development of both the dermis and epidermis, respectively, are the source that forms the skin's architecture [9]. Unique organs such as sweat glands, hair follicles, and nerves that sense that are also derived through the ect0derm and/or mes0derm are found inside these generic sections that constitute the fundamentals [10]. Approximately two million follicles of hair in people could have a substantial impact on the condition of their skin, both positively and negatively [11].

The majority of f0llicles generate short, thin, non-pigmented vellus hairs that cycle quickly. During being born, follicle in the scalp, eyelashes, and eyebrows generate lengthy rougher brightly colored, ends of hair that cycle infrequently. Nevertheless, follicle still have some flexibility in terms that the kind of growth they may create; some can go from producing ve1lus to producing termina1 hair, and vice versa. When androgen-responsive vellus follicles that produce hair are encouraged to transform into terminating follicles throughout puberty, this is especially evident [12].

2. Material and Methods

Subject population

The investigation was carried out at the Al-Kafel Hospital's Artificial Kidney Unit in the Iraqi region of Karbala. Twenty controls and twenty patients with hair loss made up all forty-five cases that were analyzed. The time frame for collecting these specimens was July 1st to November 30, 2022. Individuals with loss of hair served as testing specimens, and none of the study participants smoked or suffered with overweight. The patients are between the ages of Ten and Forty.

Exclusion criteria

None of the investigation's participants smoked or suffered from overweight. The patients are among the ages of Ten and Forty.

Collection of blood samples

sterilized instruments were used to extract five milliliters of blood from the vein. The specimen was placed into the tube accompanied by the labeling. After centrifuging the bloodstream at 6000 rpm for fifteen minutes and letting it clotting for ten more minutes until the same temperature, the blood product was separated and frozen at 80 degrees Celsius until the laboratory analysis for the study could be completed.

Biochemical Parameter

Utilizing an enzyme-linked immunosorbent test (ELISA) prepared in accordance with Elabscience, China-Cat-No. E-EL-H0066, the vitamin D3 concentrations in the serum were measured.

Determination serum ferritin concentration

Utilizing an enzyme-linked immunosorbent test (ELISA) prepared in accordance with Elabscience, China-Cat-No. E-EL-H0078, the serum ferric contents were measured.

Determination zinc concentration

The zinc concentration in the serum was determined using the colorimetric technique. The French company Biolabo SA provided a specialized kit for determining the levels of human urea in serum.

Statistical analysis

The SPSS software was used to statistically analyze the data (SPSS, Version 26). Multimodal ANOVA with correlation coefficients have been utilized to compare the parameters that were evaluated across the separating groups. Each of these was examined statistically at a

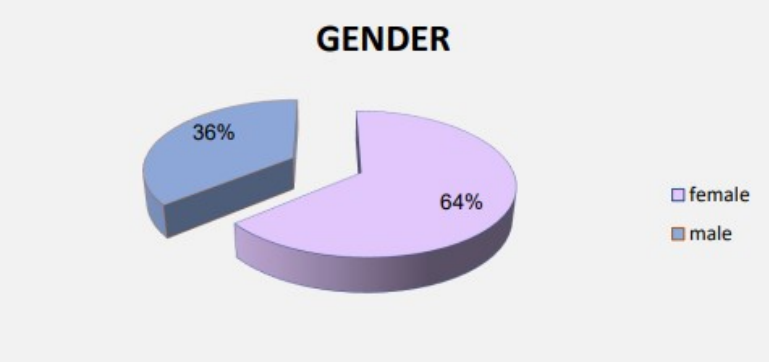

Figure 1: The gender percentage distribution of hair loss

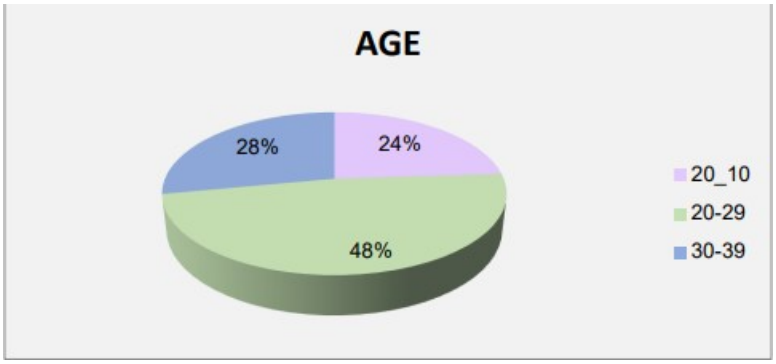

Figure 2: The age percentage distribution of hair loss

substantial P<0.05.

3. Results

Demographic Characteristics of study subject

The results of forty-five cases 25 individuals who had hair loss and 20 controls were investigated in the present investigation. As illustrated in Figure 1, The people being treated ranged in age from ten to forty. The results showed a gender breakdown across the individuals, with thirty-six percent of the men who took part and 64% of the female participants experiencing losing their hair. Additionally, the percent of patients with hair loss by gendered was depicted in Figure 2.

As shown in Table 1 there is significant decrease in vitamin D3, ferritin and zinc in patients with hair loss in comparison to healthy group

Comparison of the biochemical characteristic between gender Groups of Patients with hair loss

Vitamin D

Figure shown the biochemical test levels between the gender groups. As illustrated in Figures 3 there is significant decrease ($p<0.05$) in serum levels of vitamin D3 in female with hair loss in comparison with male.

Ferritin

Figure 4 revealed, there is no significant difference ($p<0.05$) in serum levels of ferritin in patients with hair loss in comparison between male and female of study subject.

Table 1: Comparison of the clinical characteristics between patients with hair loss and control groups.

Biochemical characteristics	Mean± SE	
	Patient N=40	Control N=20
Vitamin D (year)	16.1464±1.496 *	50.50 ± 3.7
Ferritin (kg/m2)	15.47±4.54*	200.65± 19.37
Zink	9.54 0.62*	14.3±0.44

* P< 0.05 statistically significant with control group

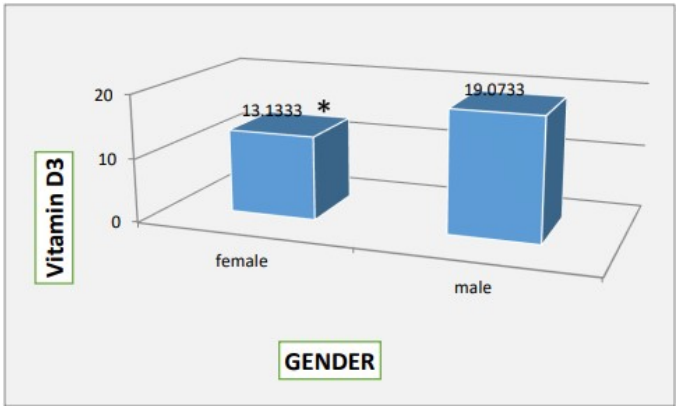

Figure 3: Comparison of the vitamin D3 (mg/dl) between gender Groups of Patients with hair loss.
P< 0.05 statistically significant with control group

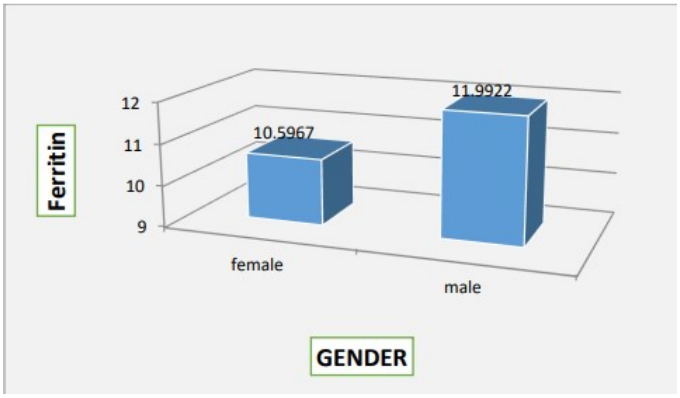

Figure 4: Comparison of the ferritin (mg/dl) between gender Groups of Patients with hair loss
P< 0.05 statistically significant with control group.

Zinc

Figure 5 revealed, there is no significant difference ($p<0.05$) in serum levels of zinc in patients with hair loss in comparison between male and female of study subject.

Comparison of the biochemical characteristic among age Groups of Patients with hair loss

Vitamin D

As illustrated in Figures 6, there is significant decrease ($p<0.05$) in serum levels of vitamin D3 in patients with hair loss with age (30-39) in comparison with (20-29).

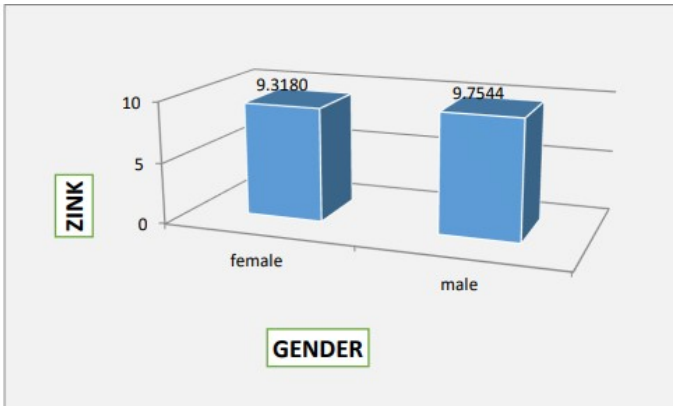

Figure 5: Comparison of the vitamin D3 (mg/dl) between age Groups of Patients with hair loss
P< 0.05 statistically significant with control group

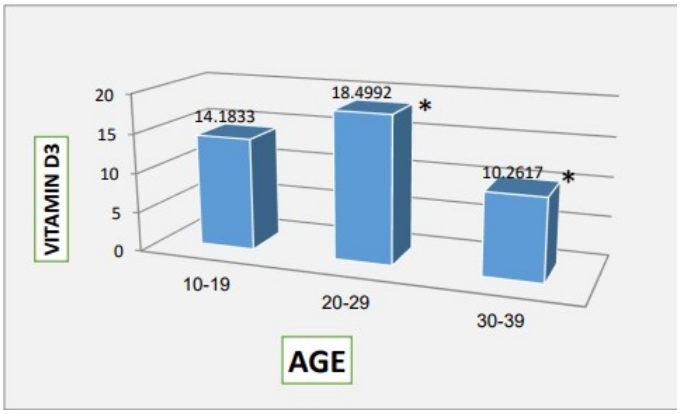

Figure 6: Comparison of the vitamin D3 (mg/dl) between age Groups of Patients with hair loss
* P< 0.05 statistically significant with control group

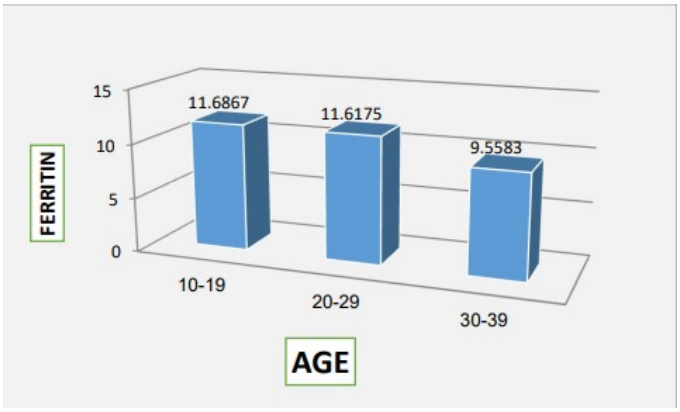

Figure 7: Comparison of the ferritin (mg/dl) between age Groups of Patients with hair loss

Ferritin

The result of Figure 7 revealed no significant deference (p< 0.05) of ferritin in patients with hair loss in comparison among age group as shown in figures.

Zinc

the result of Figure 8 revealed no significant deference (p< 0.05) of zinc in patients with hair loss in comparison among age group .

Correlation

4. Discussion

The results of forty-five cases 25 individuals who had hair loss and Twenty controls—were investigated throughout the present investigation. According illustrated in Figure 1, The patients ranged in age from ten to forty. The results showed that men comprised the majority of the people, including thirty-six percent of men in the study and sixty-four percent of the female participants experiencing hair loss. Additionally, Figure 2 showed the proportion of patients with hair loss by genders. According to Table 1, people who experience loss of hair have significantly lower levels of vitamin D3, ferritin, plus zinc than those in the healthy category.

The results obtained corresponded to line with those of Saini and Mysore (2021), which discovered that vitamin D plays a complex role throughout a number of processes of signaling related to hair cell differentiation and development. The majority of research indicates a negative correlation among serum vitamin D levels and non-scarring alopecia's, including a condition called orogenetic baldness, areata of hair, and tel0gen effluvium, among other conditions. Scarring alopecia is also linked to vitamin D insufficiency. Nevertheless, there aren't

Table 2: Correlation between the biochemical characteristics of patients with hair loss.

Correlations		Age	Vitamin D3	Ferritin	zinc
Age		1	0.372*	0.281	0.214
Vitamin D3	Pearson Correlation Sig. (2tailed)	0.372*	1	0.093	0. 336
Feritin		0.281	0.093	1	0.226
zinc		0.214	0.336	0.226	1

* Correlation is significant at the 0.05 level (2-tailed)

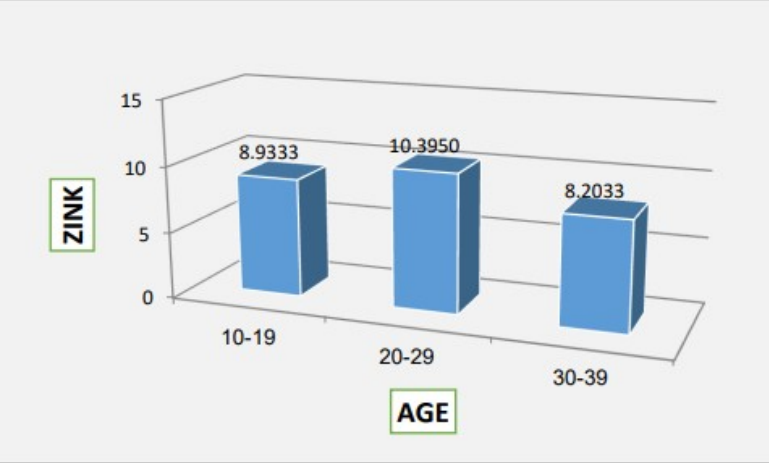

Figure 8: Comparison of the zinc (mg/dl) between age Groups of Patients with hair loss
P< 0.05 statistically significant with control group

enough reliable research showing whether vitamin D supplementation helps treat hair loss and manage these disorders. Therefore, while vitamin D is often suggested to be a therapy possibility to choose these disorders, more research is required [13].

Our conclusions were supported by another earlier study which discovered low serum ferritin and vitamin D2 are linked to hair loss in females experiencing female pattern hair loss (FPHL) and telogen effusion (TE). Psychotherapy of the condition may benefit from testing to determine these nutrients in individuals with hair loss and supplementation these nutrients if these are lacking [14]. Additionally, evidence showed that the production of proteins essential to the growth of hair recycling is either or both directly and indirectly regulated by the vitamin D receptor [15]. The study's findings concur those those of Park et al. (2013) [16].

researchers reviewed hair loss individuals' charts in the past and discovered that individuals experiencing male and female pattern hair loss had significantly decreased ferritin levels in their blood than the control group. However, the findings from this research are at odds with those of Bregy and Trueb, 2008 [17], who assessed ferritin levels in the blood in 181 apparently healthy women suffering from excessive telogen effluvium and/or female pattern hair loss and came to the conclusion that there was no correlation among the two. Additionally, our findings are consistent with other research [18–20] showing a link among female hair loss and decreased iron storage as measured through ferritin in their blood levels.

However, additional investigations [21] did not find a significant relationship among hair loss as well as 1ron deficiency. The discrepancies has no obvious clarification, therefore further research is undoubtedly required to settle important fundamental dispute. 1ron, some of many crucial micronutrients for the functioning of our bodies metabolic process, constitutes one underlying among the most frequently mentioned nutritional factors that contribute to hair loss. iron deficiency has been shown as having been linked to numerous clinical diseases because of its multiple purposes [16].

low iron stores were originally thought to serve as a potential trigger in both disorders because non-anemic iron deficiency was initially proposed as a probable pathophysiological cause for diffuse hair loss [22]. According to earlier research, iron levels dropped while hair loss increased. Regarding the function behind metals, which is among the crucial micronutrients in the human body's metabolic processes, it is one of most frequently mentioned dietary factors that contribute to hair loss.

Iron deficiency is recognized to be responsible for numerous clinical disorders because of its various functions, although its significance in hair loss is still unclear [16]. The overall average serum zinc level in every single of the subjects with hair loss individuals included in the present research was much lower than that of the standard control category. The entire population for the investigation in 312 hair loss individuals had zinc values that were significantly lower than those of Thirty healthy control subjects [23]. Copper and zinc are vital micronutrients which are crucial to the immune system's metalloenzyme function. While copper is engaged in lysyl dehydrogenase and tyrosinases, which contribute to the formation of melanin as well as the collagen cross-liking1, zinc contributes throughout the creation of proteins and nucleic acids and is engaged throughout a number of metabolic pathways and cellular functions1. Zn is a strong regulator of follicle hair growth retraction and speeds up hair follicular regeneration in relation to loss of hair [24].

In particular, one of the main pathophysiologies of a condition known as enteropathy that causes hair loss is temporary zinc deficiency [25]. During the 1990s, there is evidence claims that inadequate levels of zinc may interfere with development of hair [26]. Yet another opposing viewpoint holds that there indeed is no connection between zinc and hair loss [27]. A different investigation, nevertheless, discovered that although plasma copper and zinc levels differed between people with loss of hair and healthy people, the variation was not statistically significant [28]. The mineral zinc was an essential part of zinc thumb designs and numerous recording factors that control hair growth through the hedgehog communication, as well as it is some catagen preventing by means of its detrimental impact upon apoptosis-related cleavage enzyme [29]. The precise cause during zinc's effect on losing their hair is still being investigated, but zinc-related metallic enzymes might have an opportunity for controlling the development of hair. Figure 3, 4, and 5 indicate the differences in biochemical quantities among the male and female groups.

Figure 3 shows that serum levels of vitamin D3 are significantly lower ($p<0.05$) in females experiencing losing their hair compared to males. However, the results in Figures 4 and 5 showed that there was no significant difference ($p<0.05$) comparing thefemale and male research subjects' ferritin in the blood as well as metal concentrations among people who had diminished hair growth. With conflicting findings, a number of research were conducted to assess the impact of vitamin D supplementation in various hair diseases. According to certain research, women who suffer from areata alopecia, female pattern receding hairline, and persistent telogen effluvia had low levels in their blood of vitamin D. [30] and [29].

However, two investigations [31] and [32] found no relationship between plasma vitamin D levels and the degree and severity of male

androgenetic alopecia. Age category differences in metabolic assessments are displayed in Figures 6, 7, and 8. Figure 6 shows that serum levels of vitamin D3 are significantly lower ($p<0.05$) among individuals experiencing losing their hair aged 30–39 compared to those aged 20–29. Figures 7 and 8 illustrate that iron and zinc concentrations in losing hair individuals did not significantly differ ($p<0.05$) within age groups.

This outcome was consistent with the previous research. The active chemical component of vitamin D, 1,25-dihydroxyvitamin D (1,25[OH]2D; calcitriol), is impacted by aging. While added hyperparathyroidism helps keep up serum 1,25(OH)2D levels, aging-associated changes in the kidneys cause a fifty per cent decrease in 1,25(OH)2D synthesis [33]. In a prior investigation [34],

With a mean age of 29.11 ± 7.30 years, of the 24 patients, 60% were between the ages of 15 and 30, 30.77% were between the ages of thirty-one and 40, 0% had between that ages of forty-one and fifty, and 2.22% were beyond the median age for Fifty. sixty-eight percent of those who participated in Sarda et al.'s 2015 research of FPHL patients remained between the ages of eighteen and thirty, fourteen percent were between the ages of 31 and 40, 8% were between the ages of forty-one and fifty, and ten percent remained beyond above the age of 50 [35]. The mean age of FPHL people in the research conducted by Zhang et al., Deloche et al., and Sarda et al. These were the ages of 29.22 ± 13.01, 34.4 ± 10.6, and 34.9 ± 11.1 years [35, 36]. According to the findings of the association and linear regression amongst the people with hair loss sufferers described in Table 2, sunlight exposure D3plus the chronological age of individual hair loss patients were significantly positively correlated. However, the other results in the same table showed that the remaining tests of biochemistry within the investigation did not significantly correlate with one another.

5. Conclusions

Prior to receiving additional treatment, all patients with diffuse hair loss should have their bloodstream iron and vitamin D levels assessed since we found that the person in the organization's iron along with vitamin D concentrations were noticeably low. Zinc deficiency was found in every case. Consequently, it is imperative that all patients who report widespread diminished hair growth have their vitamin zinc levels checked on a regular basis.

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