ABILITY OF BOND OF EXTRACTS OF BILES' ACIDS THROUGH PREPARATIONS CHITOSANS IN BIOPHARMACEUTICAL MODEL OF ALIMENTARY LINE

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1. Introduction

Fats undergo digestion in alimentary line. Process of digestion of lipids begins in stomach under of hypoglossal lipase and lipase of mucous's grassland of trunk of stomach. They digest they first of all triacyloglicerols from milk with short fatty acids to monoacyloglicerols. Main process of digestion of lipids sets cholesterol and fosfolipase A_2 in duodenum at part of pancreatin lipase, esterases.

Digestion of fat in duodenum is facilitated emulsifying triacyloglicerols about long acids chains onto small billes through products of digestion of lipids in stomach, by fosfolipids and bile acids, which, enlarging surface of connection of enzyme with substratum. It is different activator colipase, created polypeptide in pancreas and ions of limestone, which shift equilibrium of reaction onto right side, across removing of product, i.e. through create of calciums' soaps, that is wresting of created fatty acids from environment of reaction [1 - 5].

Qualification of ability of bond of extract of biles' acids was aim of work by show chitosans in helping medicines slimming. Phenomenon of adsorption of extracts of biles' acids dynamic method was studied in biopharmaceutical model imitating conditions in vitro. Quantities of extract of biles acids by chitosan were counted from difference of concentrations of studied extract of acid in front of and after sorption. Results of measurements of quantity of connected extract of biles' acids adsorbing of dose were used to calculation of average percentage.

2. Materials and method

It takes advantage in work about degree from deacetylation 85 for 95% natural chitosans; from 5 for 30 kGy degrade dose radiation. Fundamental measurement researched of chito-

sans had determination of ability of bond on purpose by it exhighways of extract bile acids. Model of biopharmaceutical feed wire take advantage for account of amount of bile acid binding capacity by different kind of chitosans [9].

Research lead in with water shaking, conditions at behavior of condition in feed wire of person as the most reminiscent. It establishes amplitude of shake and speeds add and temperature of process shaking 37 °C. It weighs for about capacity 5 ml centrifuge vials. The volume corresponded to 0.03 g of chitosan. It add next 2 ml 0.05 N HCl and for disbanding. For getting 2 pH, be in state (condition) respondent reaction of stomach on an empty stomach, it add 0.05 N HCl. Next 0,2 M Na_2CO_3 was added in drops to obtain pH of duodenal juice at pH 6,4 and shaken (300 rpm) for 0.5 hrs. The sample with pH 7.0 - 7.6, corresponding to intestinal juice of the small intestine and the colon was incubated at 37 °C, shaking (300 rpm), for 2.5 hrs.

Match cause peaceful temperature, it heed with their contents centrifuge vials and in by 20 minutes, shaking (2100 rpm). It leave for stabilization on 0.5 hours next and it collect attempts from emerged match with over precipitate 1.5 ml, it transmit for clean test tubes and 2 ml added 1 N NaOH. It heeds empty test tubes and from difference of full mass and contents of substance calculates empty test tubes in attempt. It measures in method after dilution sample spectrofotometric absorbance NaOH and amount of unrelated extracts biles' acids calculate. It has allowed calculating amount of related biles' acids.

Small amounts of products have caused, that it process method of meaning for 30 mg sample, from 100 mg which scratch salts biles' acids. It perform measurements three samples, it calculate average results from which. It subject gotten data discerning statistic estimate. Ratio defines for researched attempt relativity index, defining repeatability measurement, after previous assignment of statistic error.

Measurements were led at use in constant temperature 25 °C automatic Ubbelohde viscometer. Water solution of 0.1 M acetic acids was employ and it filter solution for separating insoluble fraction 0.2 M sodium chloride. For all solutions and time of outflow gauge them three with solutions of viscometer. At least five measurements execute for each concentrating. Since the Mark-Houwink parameters used to recalculate intrinsic viscosity into viscosity-average molecular weight are known for chitosan in this solvent composition ($K = 1.81 \times 10^{-6}$ dm^3 g^{-1}, $\alpha = 0.93$) [10]. It present results in Table 1 and on Figure 2.

3. Results and discussion

3.1. Influence of degree of degradation ascertain on amount of related extract bile acids

Degree of radiation degradation effects amount of biles' acids to very differentiated manner by individual tied of chitosans. It ascertain on base of carried research, that it has related from among chosen amount of biles' acids biggest Chito Clear (1015), it use dose for which (who) degradation 20 kGy of chitosans. They will achieve similar result about dose 15 kGy and 5 kGy of Chito Clear (1015). It has related the least of salt of soda bile' acids about dose of radiation 10 kGy of chitosan (343), and insignificantly more same not subjected degradation chitosan.

Table 1. *Influence on bond of exhighway of extracts bile acids by important viscosity average of chitosans; [η] - intrinsic viscosity, $M_{[\eta]}$ - viscosity-average molecular weight, SD - standard deviation, Wz - relativity coefficient.*

Kind chitosans	Ionizing radiation, kGy	[η], dm³g⁻¹	$M_{[\eta]}$, kDa	Average Mass (g) of extract biles' acids bound by 1 g of chitosan	SD ±S, g	Wz, %
Primex food grade 85 BN 399	0	0.2852	388	1.30	0.0221	1.70
	5	0.2545	343	1.25	0.0085	0.68
	10	0.2282	293	1.34	0.0104	0.77
	15	0.2057	270	1.19	0.0142	1.19
	20	0.1872	242	1.29	0.0065	0.50
	30	0.1576	205	1.18	0.0090	0.76
Chito-Clear TM fg 95 Batch TM 1015	0	0.5100	725	1.37	0.0475	3.46
	5	0.4172	584	1.76	0.0179	1.01
	10	0.3297	453	1.46	0.0242	1.65
	15	0.3042	416	1.76	0.0157	0.89
	20	0.2213	295	1.79	0.0105	0.58
	30	0.2550	344	1.73	0.0050	0.28
Chitosan type 343 food grade 95	0	0.6402	925	0.90	0.0046	0.51
	5	0.4588	647	1.31	0.0091	0.69
	10	0.3858	537	0.75	0.0032	0.42
	15	0.3348	461	1.47	0.0254	1.72
	20	0.2307	309	1.43	0.0085	0.63
	30	0.2700	366	1.47	0.0131	0.89
Chitosan type 352 food grade	0	0.2117	282	1.12	0.0136	1.21
	5	0.1949	258	1.26	0.0083	0.65
	10	0.1696	222	1.54	0.0274	1.77
	15	0.1639	214	1.25	0.0169	1.09
	20	0.1375	177	1.14	0.0272	2.38
	30	0.1497	194	1.14	0.0015	0.13
Chitosan HUASU	0	0.7437	1087	1.14	0.0500	4.38
	5	0.5843	839	1.36	0.0336	2.47
	10	0.5185	738	1.38	0.0062	0.44
	15	0.3717	612	1.47	0.0189	1.28
	20	0.3303	454	1.56	0.0110	0.70
	30	0.2986	407	1.29	0.0055	0.42

It observe in case chitosan Primex 85, that it diminishes along with incrementation of dose of radiation for 5 kGy amount biles' acids, it grows next and it diminishes again. Incrementation of amount writes down at radiation 20 kGy biles' acids binding and decreases at 30 kGy again. Determined incrementation exerted at degradation 10-kGy chitosan (352), however, amount of related biles' acids fluctuated at in smallest range doses remaining. Sample of degraded dose has related biggest amount in case 20 kGy chitosan (HUASU), but the least of sample of unsubjected degradation. Greatest was featured in ability of bond of biles' acid considerably of chitosan (343). Amount grew initially extract biles' acids binding

by chitosan, it diminished next, it grew again and at dose 15 kGy, 20 kGy and it fluctuated 30 kGy insignificantly.

3.2. Influence of degree of degradation ascertain on important viscosity of chitosans

It ascertain on base of analysis of influence of radiation degradation on important viscosity of chitosans, that along with decrease of average weight chitosans, it falls off also important viscosity. Biggest decrease about value influenced by radiation from 0-30 kGy degrading growing, it write down in case chitosan (HUASU). Smallest decrease observe during research viscosity chitosan (352), but he has totaled 0.0884 dm^{3}g^{-1}. Standard deviations were contained in borders from 0.0015 for 0.050 g. Ratio calculate from exemplar relativity coefficient:

$$Wz = SD \cdot 100\% / _{SP}$$

where: *SD*- Standard deviation, *SP*- Average measurement

Employed method of bond of biles' acids gives repeatable results in biopharmaceutical model by chitosans, ratios confirm that 5% totaling below.

Received results prove, that extracts of biles' acids undergo adsorption by different kind significant of this polymers confirms chitosans, what on bioavailability of biles' acids in organism of man. Average size of adsorption of biles' acids by 1 g chitosan in dependence from pH of environment is comprised 1 g to 1.79 g in borders from 0.90. The highest adsorption rate is observed above pH 7. Height of degree of degradation no always height of quantity of connected biles acids attracts behind itself.
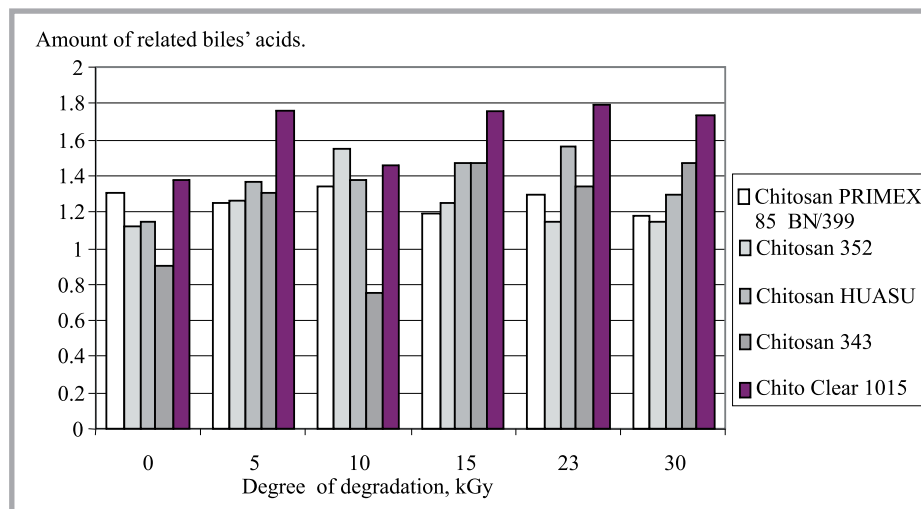

Figure 1. *Amount of related biles' acids by depending on degree of degradation bound by 1 g of chitosan.*
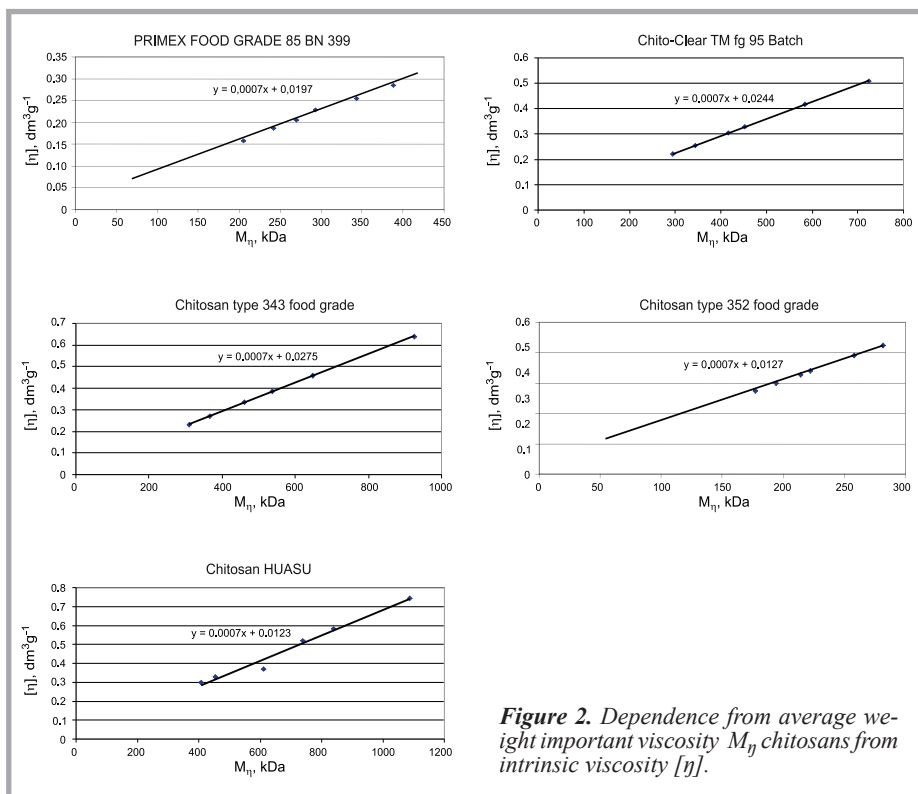
Figure 2. *Dependence from average weight important viscosity M_η chitosans from intrinsic viscosity $[\eta]$.*

4. Conclusion

Biles'acids undergo adsorption by different kind of chitosans, that confirms significant this influence on bioavailability of biles'acids in organism of person. Radiation degradation has influence on ability of bond of biles' acids of chitosans. It does not involve incrementation of degree of degradation incrementation of amount of related biles' acids always. It introduces in case researched to manner-differentiated chitosans. Modification effects change through degradation radiation important chitosans viscosity, which diminishes along with decrease of average weight of chitosans. Dependence has linear character from average weight important viscosity.

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